# Telephony.

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### Regulation by Commission Likely to be Extended.

The decision of the United States Supreme Court upholding the constitutionality of the regulation of long distance telephone rates by the Louisiana Railroad Commission is apt to have two effects.

First, it will make more general the plan of regulation by such commissions. Georgia, North Carolina, Wisconsin and Minnesota already have such commissions established. The legislatures of Michigan and Utah are considering similar action. This decision by the highest court of the Union is sure to attract the attention of the solons in other states and suggest to them the advisability of trying the plan themselves.

Second, the decision will be taken as a precedent in other states where telephone companies are under the supervision of railroad commissions as to the rates that are reasonable and will be upheld by the courts. In this case, the United States Circuit Court granted an injunction restraining the enforcement of the rates established by the commission, on the ground that the order made by it was "an arbitrary conjecture not based on an investigation or the exercise of judgment and discretion applied to ascertain facts." The lower court held that as the earnings of the company were below seven per cent its established rates were not unfair. It is this decision that the Supreme Court has reversed. The result will probably be a greater confidence on the part of such commissioners in the infallibility of their own judgment and a tendency to fix low rates. If this is the result we shall look for the pendulum of judicial decision to swing back, and, in a later case, to check the establishment of unreasonably low rates.

### Inter-State Standardization.

Until very recent times, the state has been the largest district which the Independent telephone companies could consider as an operating unit, even in the broadest sense. Methods have been developed with considerable regard for connecting exchanges, within each state, owing largely to the influence of state and district conventions, which have been plainly traceable. Much of the good work, however, which has been done within each state, along the lines of adopting uniform methods, has stopped at the boundary line of that particular political division. This is not natural. The telephone business is not limited by political divisions.

Such natural restrictions as there may be upon any field of operation are determined rather by business conditions, and, to a lesser degree, by social influences.

Continued development, along lines which will promote uniformity of operating and increase profits, particularly in long distance operation, involves the disregarding of any ordinary boundaries. The most rapid and sound progress can be attained only through unrestricted, orderly co-operation between adjacent districts. This has long been recognized, but concentrated action has been lacking.

At each telephone convention, visitors from neighboring states have been present, and informal conferences have had some value. The tendency, at present, however, is to do far more than this. An example is the meeting held at South Bend, Ind., recently, where W. S. Vivian, of Grand Rapids, Mich., and J. W. Coffey, of Indianapolis, Ind., who are in charge of the "Clearing Houses" of their respective states, met in consultation with Theodore Thorward, president of the South Bend Home Company, through whose exchange messages between Michigan and Indiana are routed. The purpose of this meeting was to agree upon a plan for further standardizing methods of handling long distance business and it is understood that the progress made will be such as to have a very gratifying and beneficial effect upon future business between these two states. Going even farther than this, the managers of all clearing houses have agreed to hold a conference early in April, and at this conference further standardization of operating methods, methods of accounting, routing, etc., will be taken up.

The long distance business is getting to be one of the most important features to which the Independent manager is devoting his attention. It is proper that the managers of Clearing Houses should take a prominent part in the development of methods, and should represent local owners in dealings which will promote local and inter-state traffic. In this work they have some very complicated problems to solve, and must accomplish much difficult work after painstaking effort, so the co-operation of local managers is essential to their success. If it is freely given, it will be a means of putting all exchanges on a more profitable basis, and increasing the amount of public favor extended to their operation.

**Lessons From Disaster.**

Though disasters are not to be invited, they may be made to teach us some things which can be learned in no other way. When men build carelessly and insufficiently, they have only themselves to blame if some time a large part of it falls down. It can not rightly be charged to "over-ruling Providence." When proper care is given to the needed strength of all parts of the wire plant, the interruptions and losses are greatly reduced. But even construction according to the best modern practice may suffer greatly under extreme conditions. Fire, crosses with power circuits, lightning, wind storms, and sleet storms, all do their part to swell the loss.

The recent sleet storms which have wrecked pole lines at numerous points should give construction men some food for thought. The railroad crossing with unprotected iron wire is an element of weakness. Locomotive smoke causes rapid rusting, and these wires are the first to give way under a load of sleet, carrying down with them many other and stronger parts of the line. Copper wire, or at least weatherproofed galvanized iron, is much better at railroad crossings.

The side line, which grows slowly, is another source of weakness. Beginning with a single circuit which is thought not worth guying, it grows by small additions until the side pull on the main lead is considerable. It needs only a sleet storm to bring it down. In other cases, where a light pull has been guyed with a small strand, the load has increased and the size of the guy forgotten. If not reinforced with a heavier strand, the day of trial will find it wanting.

The wire plant can be built so as not to be affected by these destructive forces. There is little truth in the contention that it cannot be done. Engineers of the present day can do practically anything, even to tunnelling under the Atlantic Ocean. But the question is, "Will it pay?" How far shall we go in the matter of securing safety? Though apparently fixed in individual cases by the manager or superintendent, it is really determined by the public. If the telephone plant is poorly built, and as a result gives poor and inconstant service, the people complain until conditions are changed. This means the provision of better apparatus and construction, more cable, more underground, etc., all of which entails expense. To meet the interest on increased investment the rates have to be raised, provided they were low before.

This amounts to saying that the public is willing to put up with a certain amount of interruption rather than pay the price of extreme security. The telephone exchange serves a wide range of patrons, from those who know good service, and are willing to pay for it, to those who can barely afford any service. While we should endeavor to make the telephone of the widest possible use to the community, there needs to be an educational force for better construction. The well constructed plant gives the least trouble and the best quality of service, and its up-keep should not be slighted.

**Spring Construction.**

Telephone companies almost unanimously report a demand for service which will necessitate expansion as a normal rate this year. Large waiting lists are not infrequently mentioned. Under competition, these people will soon be in possession of the facilities they require.

The construction campaign has been held up in some localities by the extent of sleet storm damage, but in most cases is now well mapped out. The companies which are in the best condition to build, and get new business, seem, with few exceptions, to be those which have the best record for number of local stockholders, and dividend payments. The evils of the policy of putting all earnings into plant instead of dividends and reserves are fully recognized, and those organizations which have been working on a more sound plan are reaping the reward of their foresight.

# An Operating Man's Experience With Pole Preservation

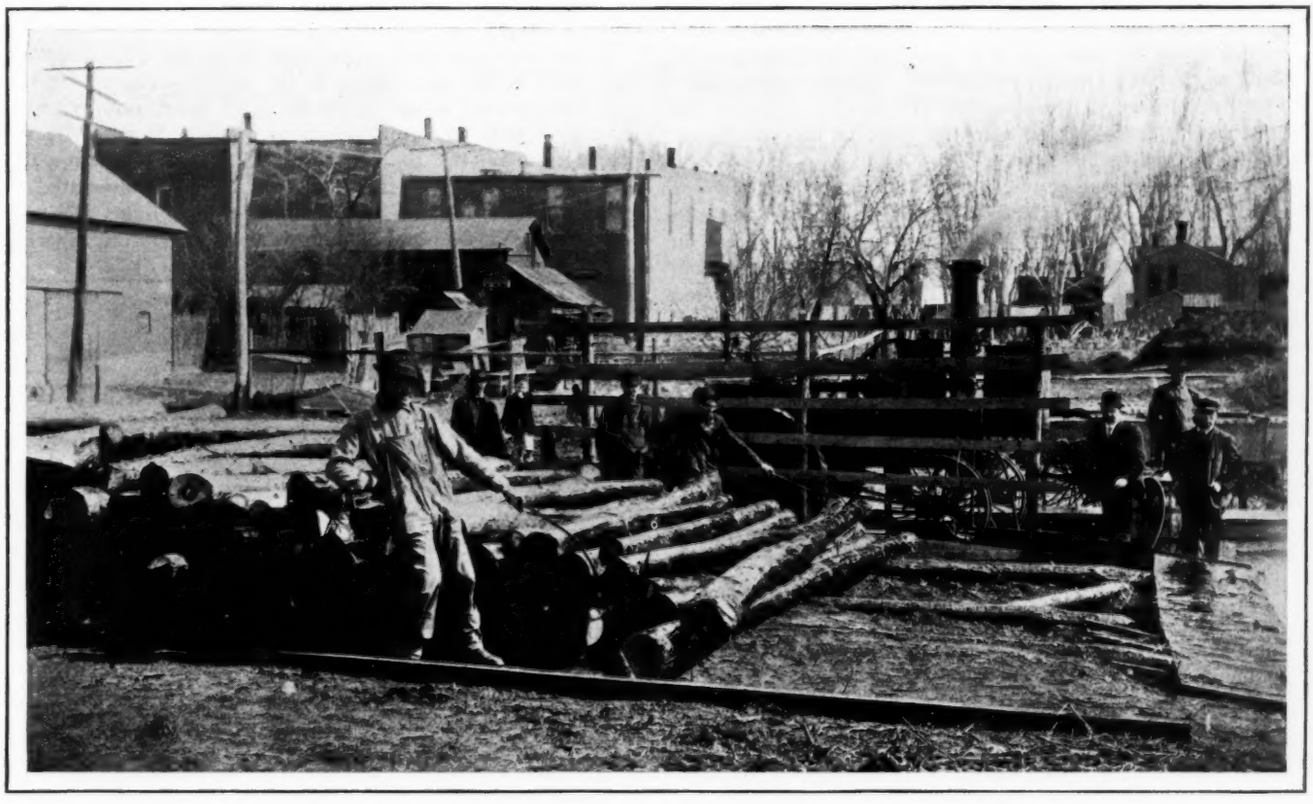
By Robert L. Parker

*General Manager Rural & Four Cities Telephone Co., Prairie City, Iowa.*

The problems of wood preservation, which are engaging the serious attention of almost every telephone operating man, do not deal so much with the advisability of employing preservatives as with the relative merits of the various products on the market, and with the difficulty of devising a suitable and practical arrangement for application, which the small operator can adopt. The telegraph and long distance telephone companies, which use large quantities of cedar poles, can afford to erect suitable retorts for treating the timber they use, but treatment in a closed cylinder, under pressure, while effective, is expensive. Consequently it is beyond the reach of the small operator.

The construction of a small telephone plant in central Iowa recently was the occasion of a few observations by the writer on the question of pole preservation. The butts of the poles used in the construction of the town exchange were given two brush treatments of carbolineum, the balance of the pole receiving an application of linseed oil and lead. I have no doubt but that the brush treatment is beneficial, and will more than pay for itself by the prolonged life of the pole, yet the penetration of the oil into the sapwood is very slight and the cost of good lead, oil and carbolineum added to the labor cost of the application, makes the treatment comparatively expensive. This fact drove us into the experiment of dipping the whole pole in an open tank, filled with ordinary commercial creosote. During the winter we dipped about fifteen hundred of the small poles used in the construction of the rural lines and found this method of treatment to be very satisfactory.

A comparatively inexpensive, but serviceable tank may be constructed by lining a long, wooden box with galvanized sheet iron, and soldering the joints. The box, or trough, may be made of rough, 1-in. planks; ordinary sheeting lumber will do for the sides, ends, and bottom. The outside frames should be made of 2x4 pieces, placed not more than 4 ft. apart, in order to give the necessary support and stiffness to the box. The length of the tank will be determined by the length of the poles to be treated; if the poles are of 20 ft. length, the box should be 22 ft. long; if 25 ft. poles are to be dipped, the tank should have a length of 27 ft. It is advisable to have the carpenter build the box at the place where it will be used, because a narrow box 27 ft. long is not a convenient "contraption" to haul around. The box should be placed in a long trench, of sufficient depth to sink the tank to a level with the surface of the ground. The tendency for the dirt along the sides of the trench to crush in the sides of the tank may be overcome by placing supports along the tank at several places. The diagram on the next page will indicate how this may be accomplished. When the rough, wooden box is in place in the trench, it is ready for the sheet iron lining, which may be obtained from any hardware dealer from sheets which ordinarily come 28 ins. wide and 8 ft. long. By constructing the box 28 ins. wide,



**Handling Poles After Treating Them with Preservative by the Open Tank Method**

with sides 26 ins. high, these sheets of iron can be used without waste. The sides should be nailed in place first, leaving one inch to be turned over at the top, and one inch to turn under at the bottom. The bottom sheets may now be nailed down and the joints soldered. To keep rain and snow from getting into the tank, a lid should be made of

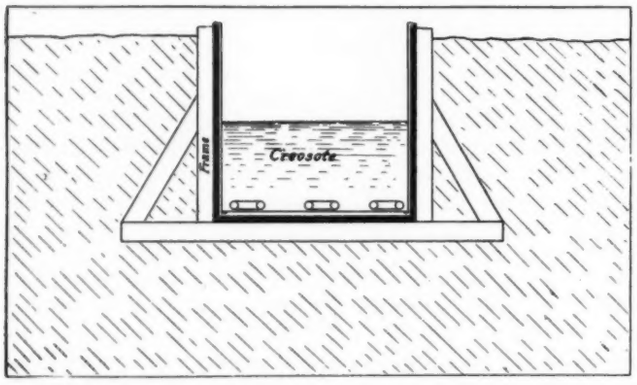



**Diagram Showing Method of Reinforcing Sides of Tank.**

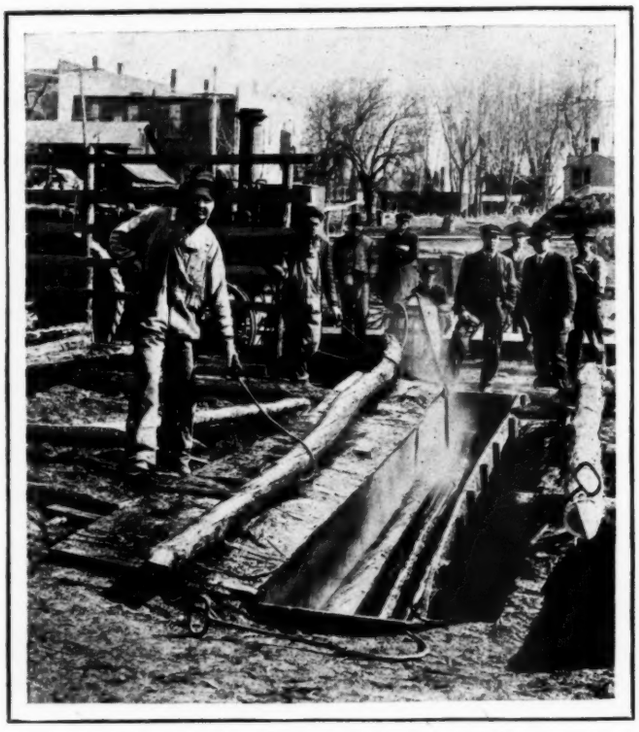
rough lumber, covered with galvanized sheet iron. This cover, laid to one side at working times, is used as a platform to catch the drippings from each pole when it is first removed from the tank. Such a tank will cost, for material and labor between $20.00 and $30.00. Owing to the fact that a large part of the expense of treating poles is the labor cost, it is best to locate the tank in the pole yard, near the timber to be treated.

Probably the most convenient and practical method for heating the oil in the tank is the use of steam pipes. In a tank of the size described, six 1-in. pipes, connected in series and laid in the bottom of the tank, in the oil, will give sufficient radiating surface. The problem of securing steam may be solved by placing at one end of the tank, any sort of steam engine or boiler which is capable of supplying steam at from 80 to 110 lbs. pressure. The amount of steam passing through the pipes may be controlled by two valves, a check valve placed at the boiler or engine, to regulate the amount of steam entering the coils, and a globe valve at the outlet of the pipes, to control the pressure. By regulating the amount of steam and pressure in the pipes, and also the steam pressure in the boiler, the temperature of the oil in the dipping tank may be maintained at the desired degree. According to Peabody's steam tables, saturated steam under 50 lbs. gage pressure has a temperature of 295 degrees Farenheit; at 100 lbs. gage pressure, its temperature is 340 degrees. The fact that steam temperatures increase as the pressure increases, makes it a very convenient means for supplying heat to the oil, and it gives very satisfactory results. It is possible to keep the temperature of the creosote fairly constant. We have been able to maintain a temperature of from 250 degrees to 275 degrees Fahrenheit during the process of dipping. Our first attempt at heating was with gasoline furnaces, but we found this method impracticable. During cold weather it was impossible to keep the oil hot, owing to the large radiating surface which the oil exposed. There was also danger of the gasoline flame starting a fire, which might spread to the nearby pole stack. All danger of fire is avoided by heating with steam.

The most common criticisms of our method of applying preservative has been directed against the idea of dipping the whole pole. I am not sure that I would advocate the dipping of large poles, of 30 ft. lengths and upwards, but in the case of small poles of 20 and 25 ft. lengths, such, as are used in the construction of rural lines, I think it advisable to boil out the whole pole.

In the first place, the labor cost of treating the whole pole is no more, and probably less, than would be necessay in case only the butt were boiled out. The light pole is easily handled; two men, one at each end, with iron hooks, can place the pole in the bath and remove it again much more conveniently than they could elevate the pole and handle it at the proper angle to immerse the butt only. Before boiling the pole in the oil, it should be roofed, gained and bored, and in this way the expense of hand painting the exposed fiber at the roof and gain is avoided; besides, the hot oil penetrates deeply at these places and gives the pole much better protection than would be afforded by a brush treatment of lead and oil. In the second place, the cost of the additional amount of oil absorbed amounts to only a few cents per pole. This additional cost, of course, depends largely upon the preservative employed, for if ordinary commercial creosote, costing from 10 to 15 cents per gallon, is used, the additional oil absorbed by boiling the entire pole will increase the cost of the treatment per pole but little. But if a high priced carbolineum is used, the additional cost will be considerable. We have found that a well seasoned white cedar pole, 20 ft. long, 5-in. top, given a ten minute boil in oil at a temperature of 250 degrees Fahrenheit, will absorb almost one gallon, and a 25-ft., 5-in. pole will absorb a little more than one gallon.

A third consideration is the benefit to the pole. Decay, of course, is the most rapid at the ground line, where the wood destroying fungi do their work most rapidly, with the result that an ordinary white cedar pole must be replaced in from ten to fifteen years. But by the time the pole has rotted off at the base, it will have depreciated to a considerable extent above the ground line. This is especially true of poles having a small diameter. Twelve



**Treating Poles by the Open Tank Method.**

years of exposure to sun, wind, rain and sleet leave the sap-wood badly disintegrated. All the checks and crevices expose the fibers of the wood, furnishing places for moisture to collect and encourage decay. Many of the checks and cracks extend almost to the center of the pole, and admit

*(Concluded on Page 401)*

# Specifications for Construction of a 35-Foot Pole Line

The following specifications covering the construction of a 35-ft. pole line were used by the American Union Telephone Company, of Harrisburg, Pa., which now includes the Consolidated Telephone Companies, of Pennsylvania. With a specification of this kind strictly observed, and all details carried out, a telephone company would have lines upon which the maintenance cost would be reduced to a minimum.

*Locating Lines.*—In locating lines, measure off and place stakes at equal distances of one hundred and thirty-five (135) feet without regard to obstacles. Then locate pole as near to stake as possible, not getting said pole out of line with other poles.

Locate poles in a straight line. Deflections of less than 90 degrees shall be made on one pole, and this pole shall be securely head guyed. On all turns of 90 degrees the turn shall be made on two poles, and each of said poles double head guyed as shown in Fig. 1, Sheet 2.

On all curves as many poles as may be necessary shall be used to properly support 40 wires, Sheet 2, Fig. 2.

In building a line on railroad rights of way, no pole shall be set at a distance of less than 12 feet from the edge of the nearest rail, unless the lowest cross arm on the pole is higher than 25 feet from the top of the rail. If the cross arm is higher than 25 feet from the top of the rail, the pole may be set not less than 7 feet from the rail.

In building a line in a city, locate poles on corners of intersecting streets, where possible, so as to permit of side guying.

*Clearing Obstacles.*—To clear obstacles, poles of such length shall be used as will allow the wires on four cross arms to be at least four feet from the obstacle, unless this is impossible.

*Distribution of Poles.*—In distributing poles, the heaviest poles shall be placed on corners. The straightest and best looking poles shall be distributed through cities and towns and in front of residences.

*Leveling.*—The length of poles shall be proportioned to the contour of the country, so that the wires may be strung without abrupt changes in the level.

*Road Crossing.*—The wires or fixtures to the pole shall have a height of less than 18 feet from the crown of the road.

Along railroad rights of way, no wires or attachments to a pole shall cross railroad tracks except at a height of 25 feet or higher above the rails.

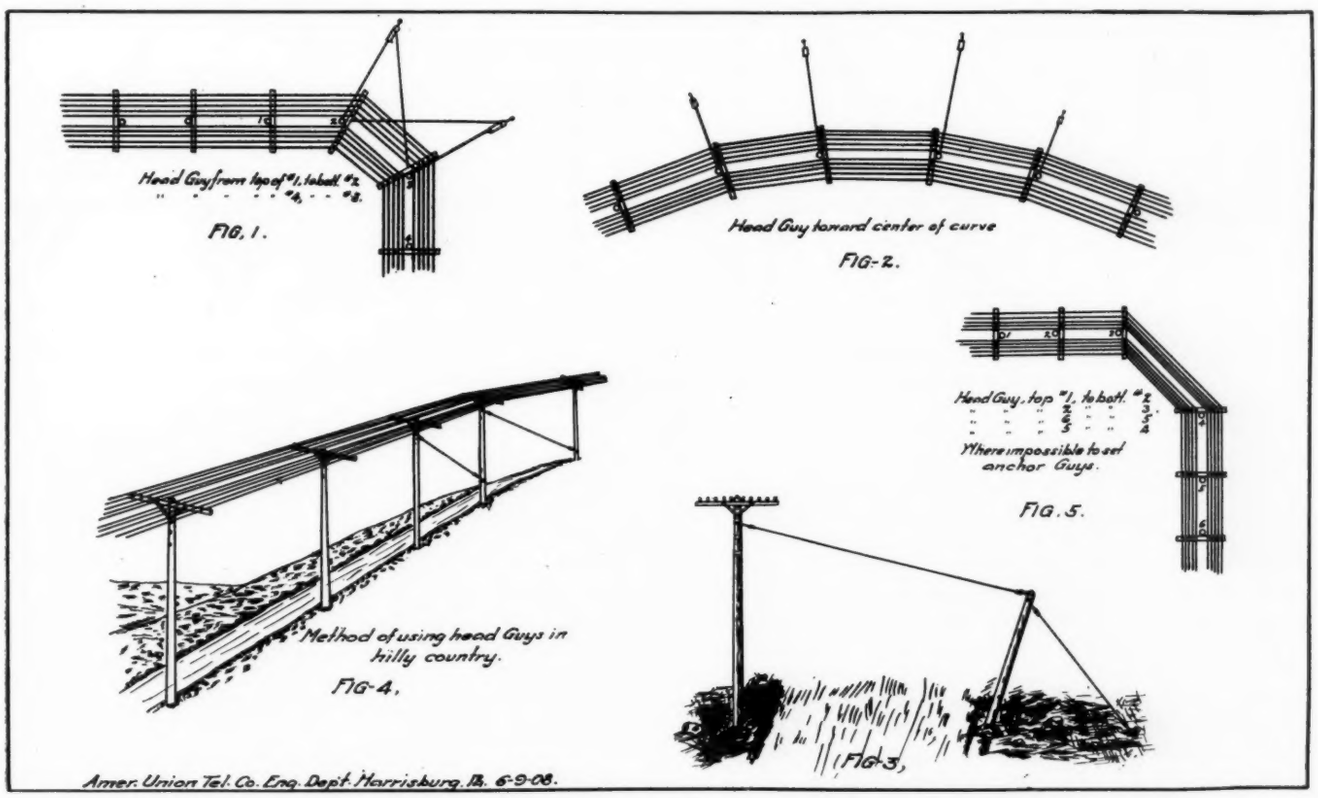
All poles must extend at least 24 feet above the surface of the ground.

*Fitting of Cross Arms.*—The braces shall be attached to the cross arm by means of four-inch galvanized iron carriage bolts. A washer shall be placed next to the head of the bolt, and the bolt is to be driven into the cross arm from the back, so as to allow the washer to rest in contact with the cross arm.

*Fitting of Poles.*—The top of the pole shall be roofed, as shown in Fig. 3, Sheet 3. Each pole shall have four (4) gains, 4¼ inches wide and one-half inch deep, spaced twenty-two inches on center. The center of the upper gain shall be ten (10) inches from the apex of the pole roof.

A five-eighths inch hole shall be bored through the center of each gain at the time the cross arm is placed in position. In fastening the cross arm in position, the bolt shall be driven through from the back of the pole, a washer being placed under the head. A washer shall also be placed on the cross arm under the nut.

Cable poles, office poles, all painted poles, and, in cities,


Head Guy from top of #1, to bolt #2
FIG. 1.
Head Guy toward center of curve
FIG. 2.
Head Guy, top #1, to bolt #2
Where impossible to set anchor Guys.
FIG. 5.
Method of using head Guys in hilly country.
FIG. 4.
FIG. 3.
Amer. Union Tel. Co. Eng. Dept. Harrisburg, Pa. 6-9-08.

**Method of Guying Telephone Lines at Turns, from American Union Telephone Company's Specifications, Sheet No. 2.**

all poles exceeding 50 feet in length and all poles carrying cable, shall be equipped with galvanized iron pole steps. The pole steps are to be driven alternately on each side of the pole on line with the street. The pole steps shall be spaced eighteen (18) inches on centers, commencing about eight (8) feet above the street level. Below 8 feet butt steps shall be used.

Lightning rods, of No. 9 wire, shall be attached to every tenth pole by galvanized steel staples, spaced two feet apart. The rod shall extend from the top of the pole to, and have two hand turns under the bottom of the pole.

On corner poles, at road crossings and other places where the line makes an angle of over thirty degrees, two cross-arm braces shall be fastened to the cross arm from the back of the pole, as shown in Fig. 4, Sheet 3, or the poles double armed. The braces shall be fastened to the back of the pole ten inches below the bolt with a 3-inch galvanized fetter drive screw and to the cross arm by 4-inch galvanized carriage bolts.

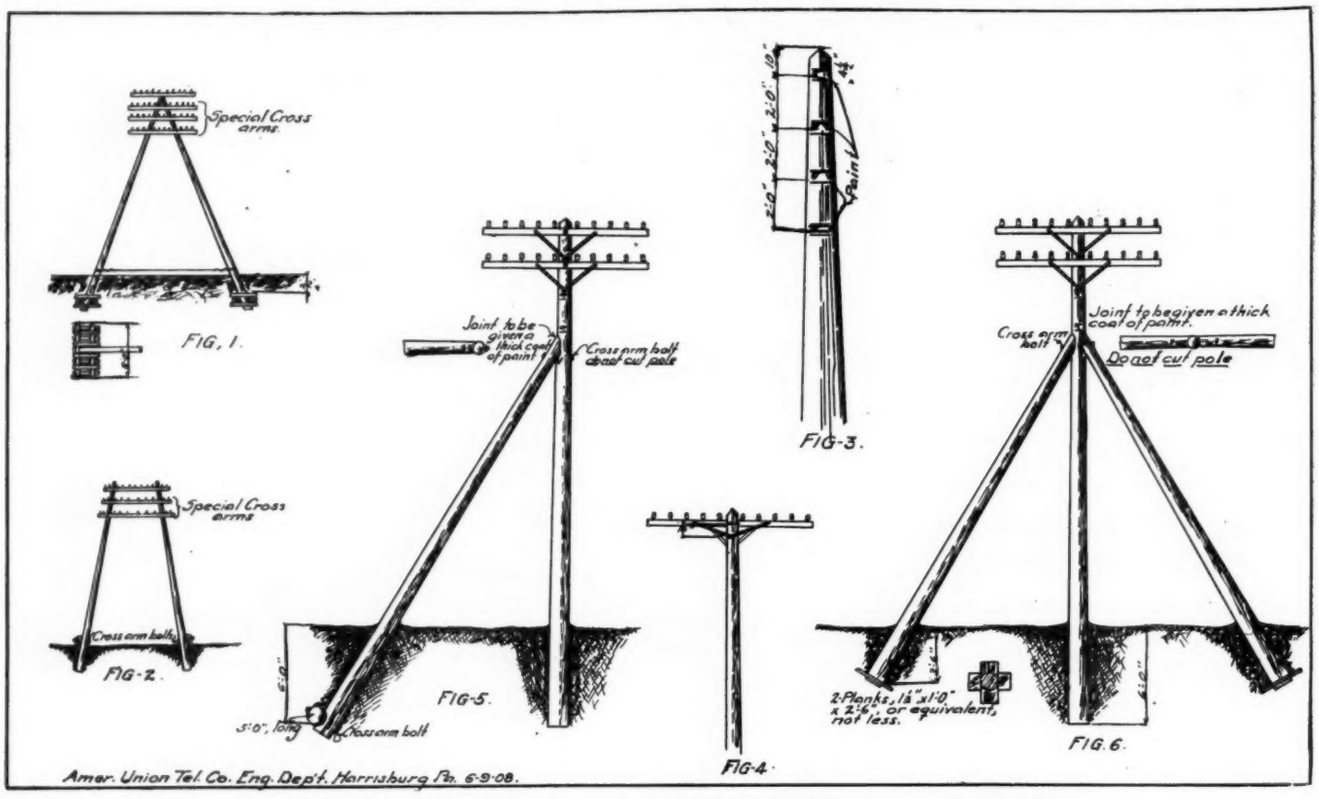
The tops of the poles and all gains shall be painted with one thick coat of metallic paint, mixed in the ratio of seven pounds of dry paint to one gallon of pure linseed oil.

*Pole Setting.*—All poles shall be set in the ground to the following depth: 30-ft. poles, 5½ feet on straight lines, and six feet on corners; 35-ft. poles, 6 feet; 40-ft. poles, 6 feet; 45-ft. poles, 6½ feet; 50-ft. poles, 7 feet. All poles shall be set vertical. All holes shall be dug large enough to admit the pole without stabbing or hewing, and shall be full size at the bottom so as to permit the use of iron tampers.

After the pole is placed in position, only one shovel shall be used in filling the hole completely. Three tampers shall be employed to pack in the filling continuously until the hole is completely filled. Soil is then to be piled up above the surface and firmly packed around the pole.

*Artificial Pole Foundation.*—When the ground is so soft as to prevent tamping, follow the specifications for such construction best suited to the condition. These are shown in figures on Sheet 4 and Figs. 1 and 2, and 6, Sheet 3. On curves in soft ground, the poles may be braced, as shown in Figs. 5 and 6, Sheet 3, using the one brace or both braces, according to the nature of the soil and conditions. When extraordinary conditions exist, consult the superintendent.

*Guy Stub Setting.*—All guy stubs shall be set in the ground




**Methods of Bracing Poles. This Diagram is Designated as Sheet No. 3 in Specifications.**

*Anchor Setting.*—The excavation for the anchor logs shall be firmly anchored by covering it with planks, logs or roots, as shown in Fig. 2, Sheet 5.

When, on account of the nature of the ground, it becomes difficult to obtain an excavation six feet deep, one of the following methods may be used. In every case make the deepest excavation possible.

Excavations five feet deep, the anchor log may be five feet long and sixteen inches in diameter, or eight feet long and ten inches in diameter.

Excavations four feet deep, the anchor log may be five feet long and 28 inches in diameter; the anchor log may be 10 feet long and 12 inches in diameter.

When logs of large circumference (use no logs less than 10 inches in diameter) are not available, cross pieces may be laid across the anchor, such cross pieces being twice as long as the diameters given above.

The minimum distance to set an anchor from the objective pole shall be 6 feet, but where possible the anchor should be so set that the guy shall have an angle of 35 degrees.

*Special Fixtures.*—When the right of way permits, "A" fixtures as shown in Fig. 1, Sheet 3, may be used, where the ground is soft.

*Bridge Fixtures.*—Submit all plans for bridge fixtures to the chief engineer for approval before completion.

*Facing of Cross Arms.*—On straight lines where the distance between the poles is equal, the cross arm shall be placed on alternate sides of the pole.

On long sections, the cross arms of the terminal poles shall be placed on the side of the pole opposite to the long section.

At line terminals, the cross arms of the last two poles shall be placed on the side of the pole facing the terminals.

On curves, the cross arms shall be placed on the sides of the poles facing towards the road. See Figs. 1 and 2, Sheet 7.

*Sag of Wires.*—String wires so that the sag shall be as given in the following table, making allowance therein indicated for temperature and length of span:

SAG EXPRESSED IN INCHES

| Temp. Fehr. | Span 75 ft. Sag. | Span 100 ft. Sag. | Span 115 ft. Sag. | Span 130 ft. Sag. | Span 150 ft. Sag. | Span 200 ft. Sag. |
|---|---|---|---|---|---|---|
| Deg. 30 bel. | 1 in. | 2 in. | 2 in. | 3 in. | 4 in. | 8 in. |
| Deg. 10 bel. | 1 in. | 2 in. | 3 in. | 3 in. | 5 in. | 9 in. |
| Deg. 10 abv. | 1 in. | 2 in. | 3 in. | 4 in. | 5 in. | 10 in. |
| Deg. 30 abv. | 1 in. | 3 in. | 4 in. | 5 in. | 6 in. | 12 in. |
| Deg. 60 abv. | 2 in. | 4 in. | 5 in. | 7 in. | 9 in. | 15 in. |
| Deg. 80 abv. | 3 in. | 5 in. | 7 in. | 8 in. | 11 in. | 18 in. |
| Deg. 100 abv. | 4 in. | 7 in. | 9 in. | 11 in. | 14 in. | 22 in. |

*Position of Wires.*—On straight lines the wires shall be tied to the insulator in the position shown at "A" in Fig. 3, Sheet 9.

On curves, the wires shall be tied to the insulator in the position at "B," Fig. 3, Sheet 9.

*Method of Tying Wires.*—The line wires shall be tied in a manner shown in Fig. 1, Sheet 9. It will be noticed that one side of the tie wire passes over the line wire and makes five complete turns, and the other passed under the line wire and makes five complete turns.

*Joints.*—The joints in the copper wire shall be made with Cook sleeves, or their equivalent, each sleeve for Nos. 10 and 12 B. & S. having three complete twists, as shown in Fig. 15, Sheet 1. See TELEPHONY March 20, page 339.

*Transpositions.*—The system of transposition to be followed is shown in Fig. 4, Sheet 9. The detail method for making a transposition is shown in Sheet 8.

In locating transposition poles, proceed as follows:

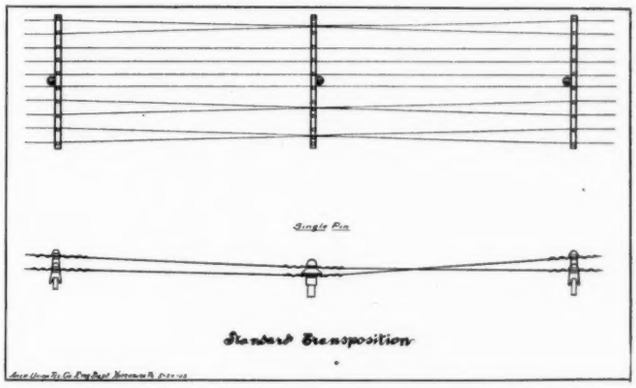
Measure a distance of 1,300 feet from the first open wire fixture and mark the pole nearest the point so measured "1."

Measure a second distance 1,300 feet, from the first 1,300 foot pole, and mark the pole nearest that point "3."

Measure a third distance of 1,300 feet, from the second 1,300 foot pole, and mark the pole nearest the point "5."

Continue in this manner to measure off all poles 1,300 feet apart, marking the poles as shown in Fig. 4, Sheet 9.

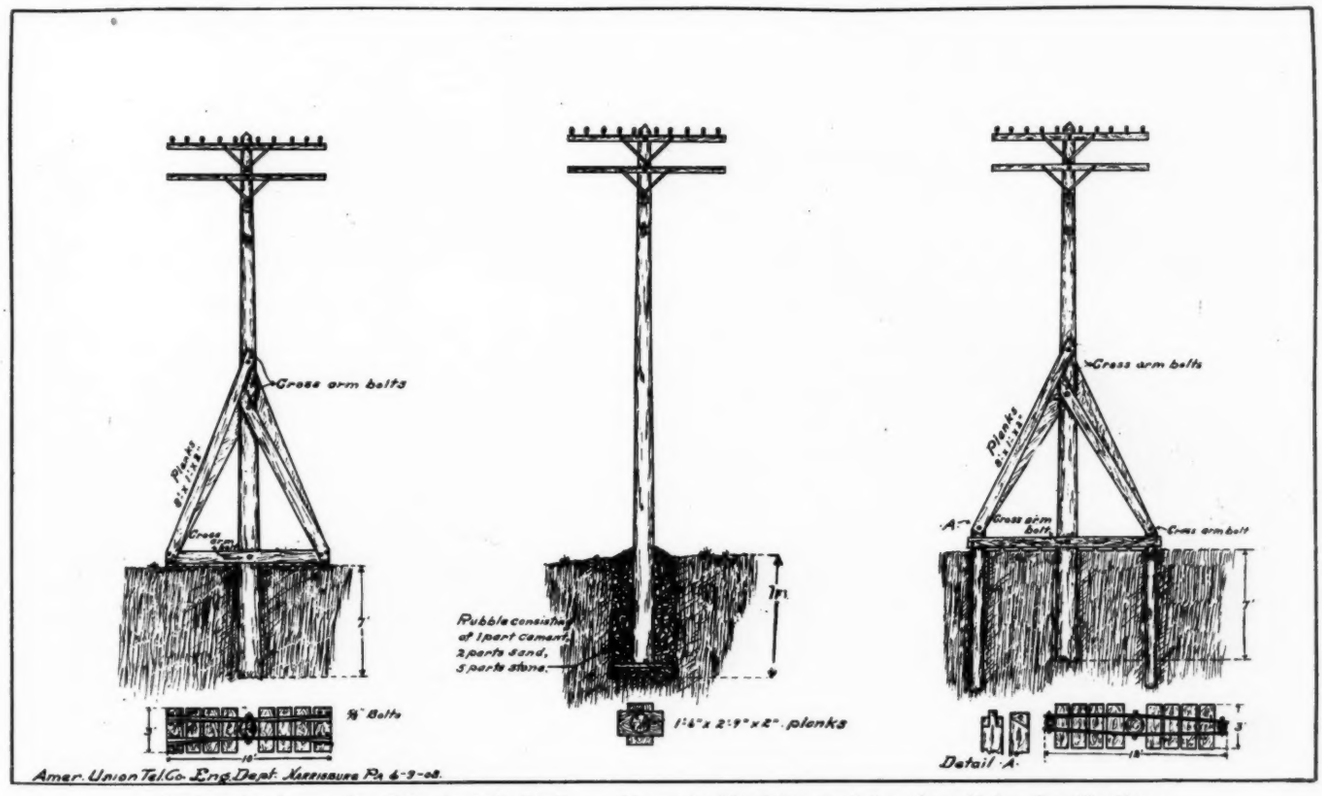
*Dead Ending.*—In attaching the wire to the last insulator on the line at any point where a run-in is to be made to an office or cable, a half-sleeve shall be used, as show in Fig. 2, Sheet 9. One and one-half twists shall be given the half-sleeve.



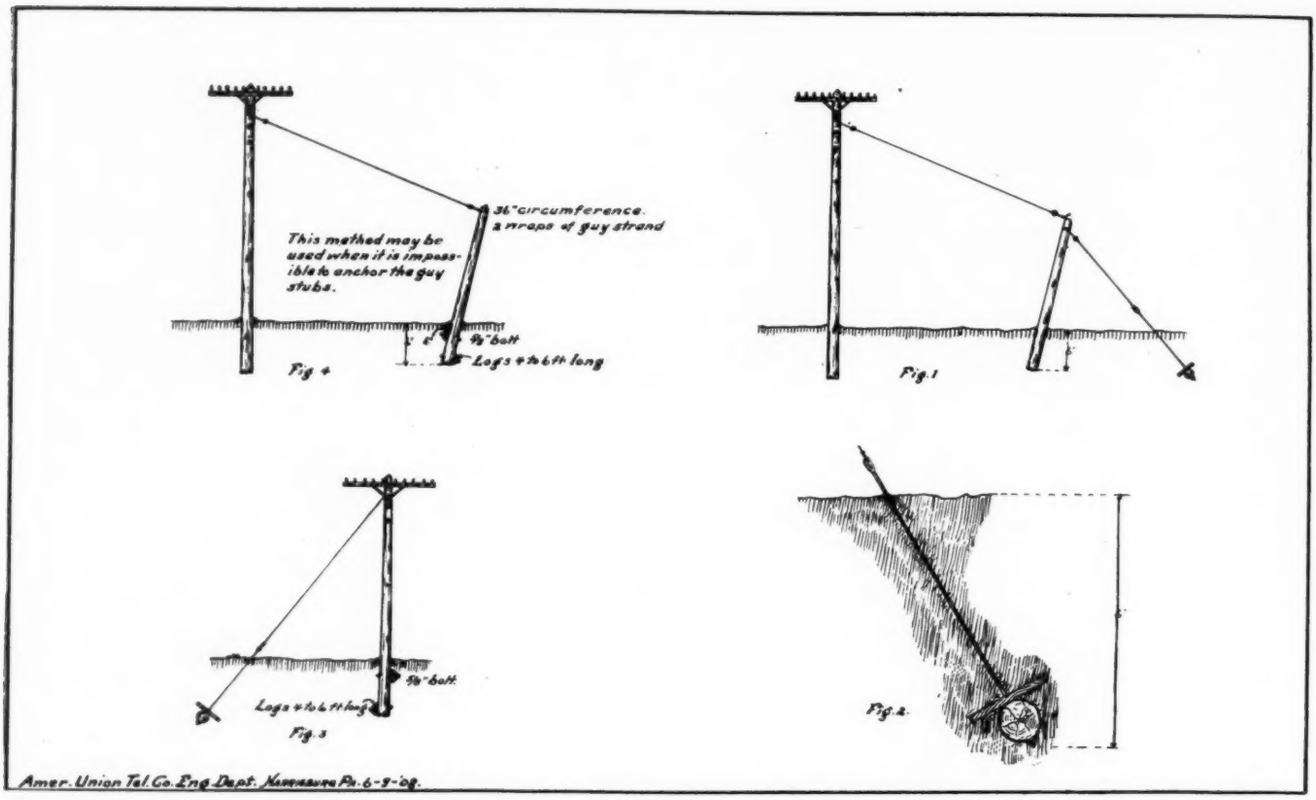

**Drawings of Single Pin Transpositions, which Form Sheet 8 of American Union Construction Specifications.**

*Long Spans.*—The terminal poles at any long span (200 feet or more) shall be head guyed, and, if possible, side guyed in both directions. Additional poles shall be set within seventy-five feet of such terminal poles, and head guyed to the terminal poles.

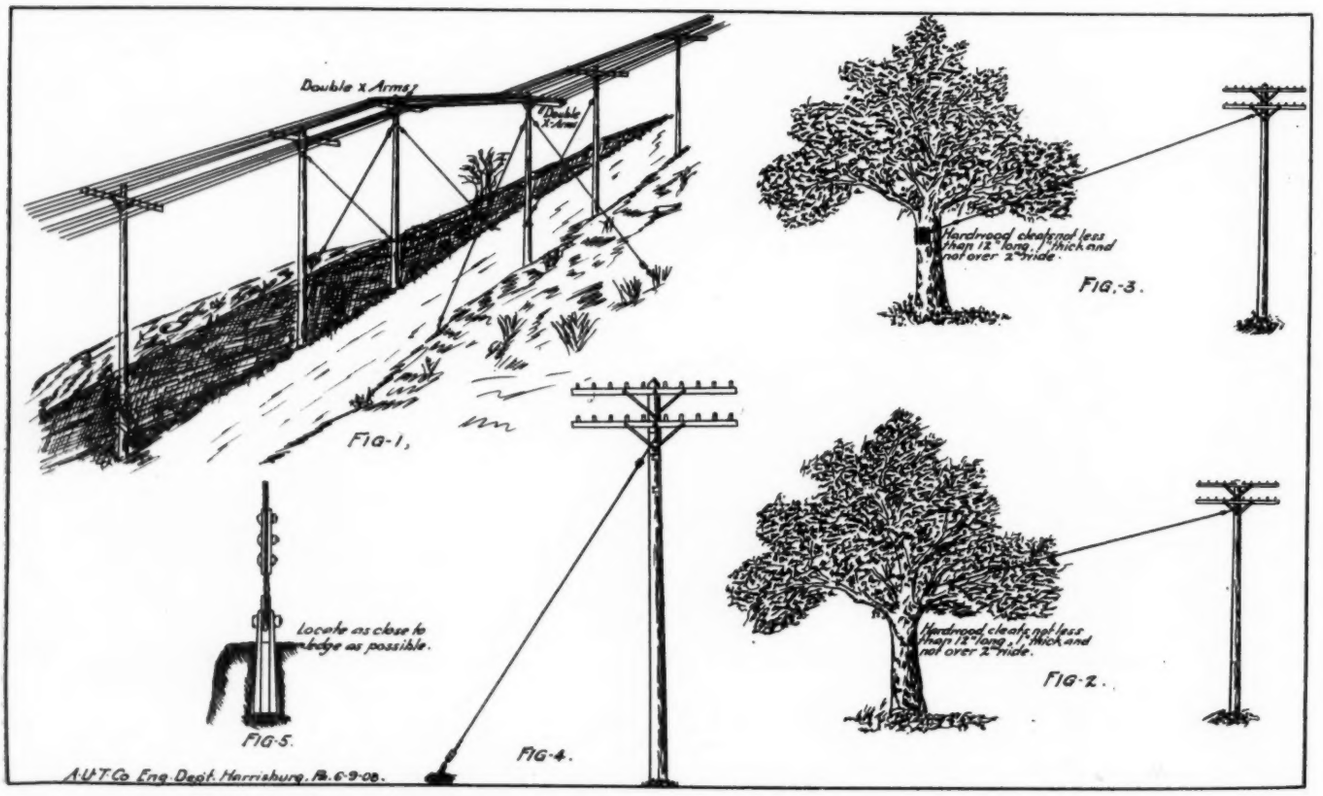
*Street Crossings.*—Wherever the pole line changes from one side of the street to the other, the crossing shall be made at an angle of about 45 degrees. Such crossing shall be guyed in the manner most applicable to the existing conditions as shown in Figs. 1 and 2, Sheet 7, and Fig. 1, Sheet 6.


Cross arm bolts
Planks
Rubble consisting of 1 part cement, 2 parts sand, 5 parts stone.
⅝" Bolts
1"x 6" x 2'-9" x 2". planks
Detail A
Amer. Union Tel Co. Eng. Dept. Harrisburg Pa. 4-9-08.

**Devices for Supporting Poles in Soft Earth, as Shown in Sheet No. 4 of American Union Specifications.**


This method may be used when it is impossible to anchor the guy stubs.
3/8" circumference. 2 wraps of guy strand
5/8" bolt
Logs 4 to 6 ft long
Fig. 4
Fig. 1
5/8" bolt
Logs 4 to 6 ft long
Fig. 3
Fig. 2
Amer. Union Tel. Co. Eng. Dept. Kennesaw Pa. 6-9-08.

**Method of Guying Pole Lines Used when Attachment is Made to Logs Instead of Patent Anchors. This Drawing is Known as Sheet No. 5 in Specifications.**

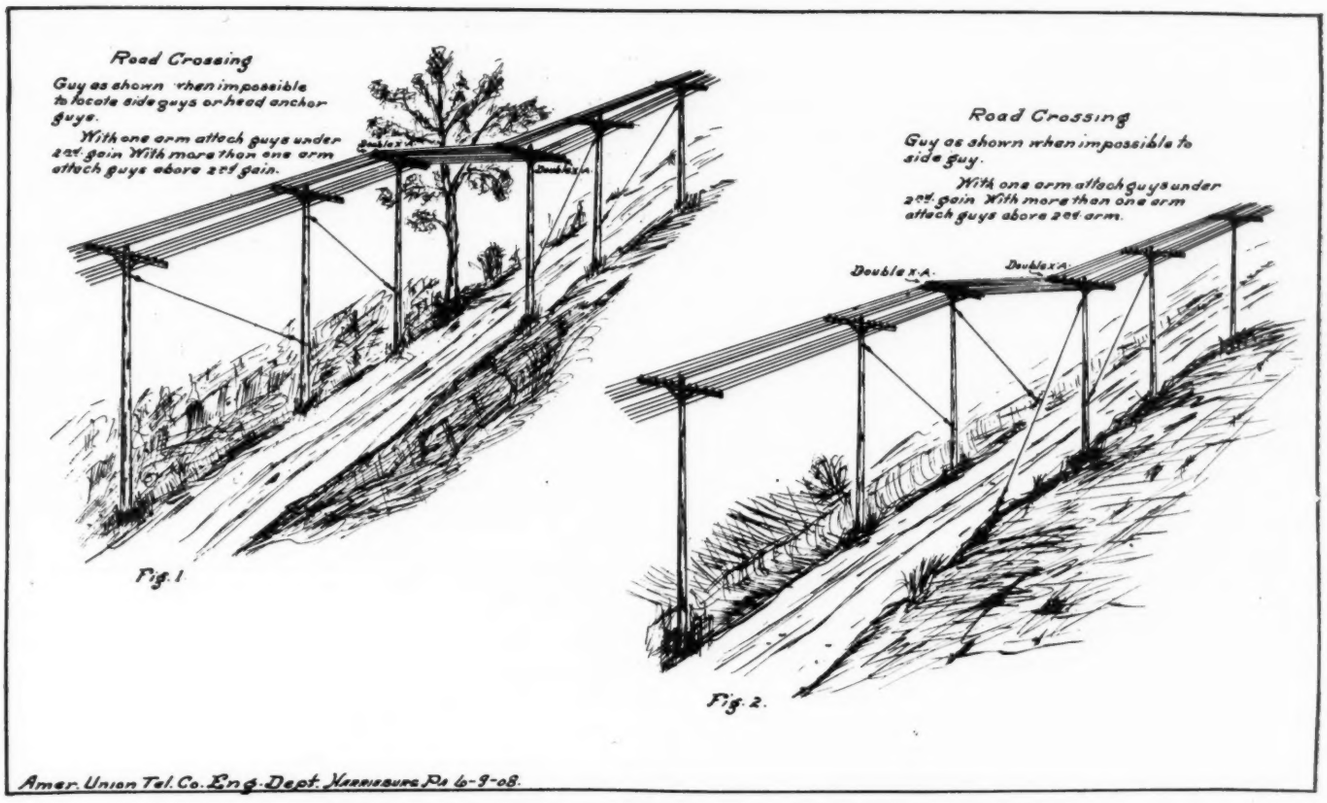

Double X Arms
Double X Arms
FIG-1.
Hardwood cleats not less than 12" long, 1" thick and not over 2" wide.
FIG.-3.
Locate as close to ledge as possible.
FIG-5.
FIG-4.
Hardwood cleats not less than 12" long, 1" thick and not over 2" wide.
FIG-2.
A.U.T.Co. Eng. Dept. Harrisburg, Pa. 6-9-08.

**Street Crossing, Rock Anchor and Tree Attachments as Shown on Sheet No. 6 in Specifications.**

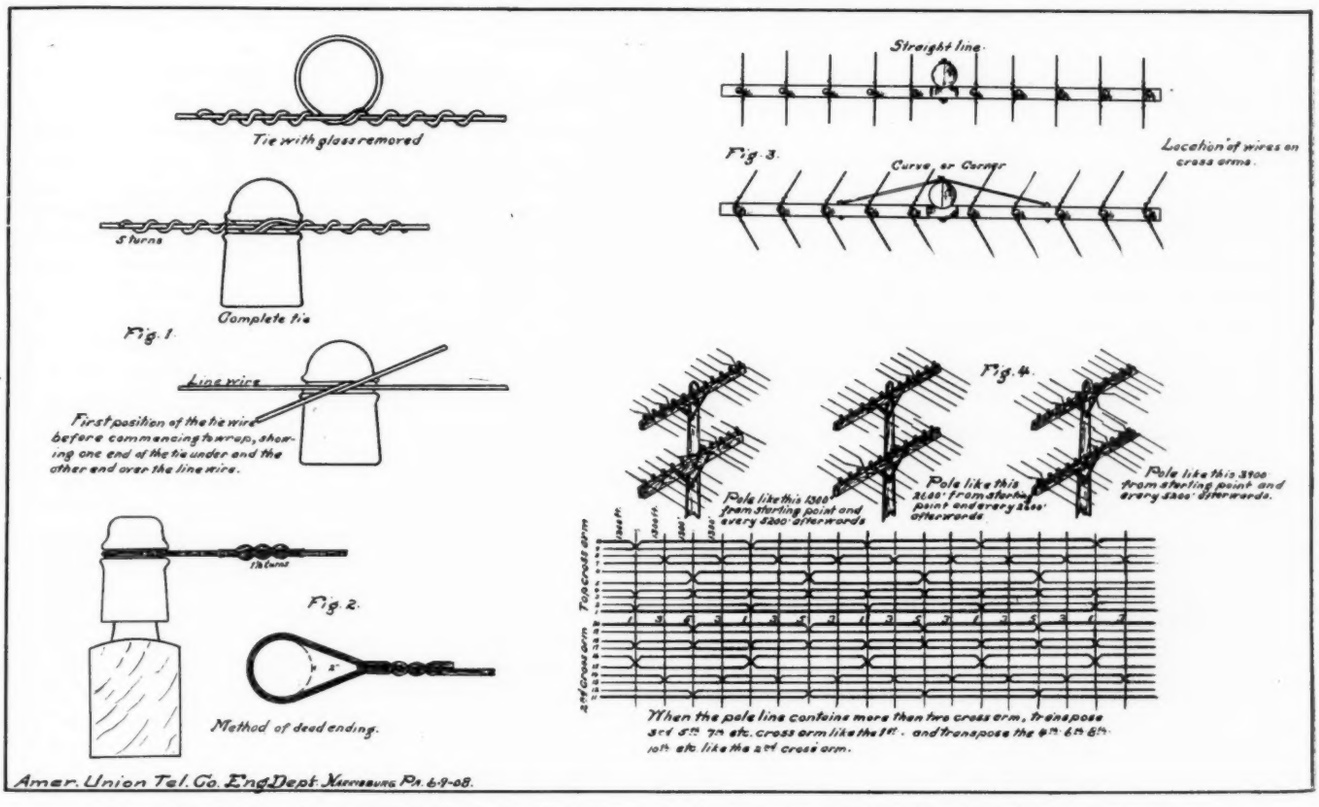
*Curves.*—All curves shall be thoroughly guyed. Figs. 2 and 5, Sheet 2, show the directions in which the guy shall be placed for different kinds of curves and conditions.

*Guys.*—All guys shall be made of seven-strand 5/16-inch guy rope. They shall be pulled by means of a set block and tackle and fastened with one malleable iron clasp of the style and dimensions shown in Fig. 18, Sheet 1. See TELEPHONY, issue of March 20, page 339.

*Guying to Trees.*—Guys may be attached to suitable trees after having first obtained the consent of the owner in writing.


Road Crossing
Guy as shown when impossible to locate side guys or head anchor guys.
With one arm attach guys under 2nd gain With more than one arm attach guys above 2nd gain.
Double x A.
Double x A.
Fig. 1
Road Crossing
Guy as shown when impossible to side guy.
With one arm attach guys under 2nd gain With more than one arm attach guys above 2nd arm.
Double x A.
Double x A.
Fig. 2.
Amer. Union Tel. Co. Eng. Dept. Harrisburg Pa. 6-9-08.

Two Road Crossing Drawings from Sheet 7 of American Union Specifications.


Tie with glass removed
5 turns
Complete tie
Fig. 1
Line wire
First position of the tie wire before commencing to wrap, showing one end of the tie under and the other end over the line wire.
Fig. 2.
Method of dead ending.
Straight line.
Fig. 3.
Curve, or Corner
Location of wires on cross arms.
Fig. 4.
Pole like this 1320' from starting point and every 3200' afterwards
Pole like this 2640' from starting point and every 3200' afterwards
Pole like this 3960 from starting point and every 3200' afterwards.
When the pole line contains more than two cross arm, transpose 3rd 5th 7th etc. cross arm like the 1st. and transpose the 4th 6th 8th 10th etc. like the 2nd cross arm.
Amer. Union Tel. Co. Eng. Dept. Harrisburg Pa. 6-9-08.

Line Wire Ties and Transpositions, from Sheet No. 9 of Construction Specifications Issued by American Union Telephone Company.

The guys shall be preferably attached to the tree trunk. In exceptional cases, they may be attached to live limbs, close to the trunk, provided the limb has a diameter exceeding five inches.

The trunk or limb of the tree shall be protected from injury by being covered with strips of hard wood, each strip to be not less than one inch thick and twelve inches long, and not over two inches wide. The guy shall be wrapped twice around the tree and fastened with one guy clasp.

Fig. 3, Sheet 6, shows the method of guying to the trunk of a tree.

Whenever the guy is attached to an iron rod, a thimble,

shown in Fig. 17, Sheet 1, shall be used. See TELEPHONY issue of March 20, page 339.

The ends of the guys shall be wrapped twice about the pole and fastened with one guy clamp. The wrappings may be held in place on the back of the pole by one 3-inch fetter drive screw.

The lower end of the anchor guys shall pass through a thimble attached to a guy rod. The guy rod shall be fastened to an anchor log.

*Guy Stubs.*—Guy stubs shall only be used to raise the guys to sufficient height to clear and prevent their obstructing thoroughfares. An anchor shall be attached to each stub.

When impossible to locate an anchor for a guy stub, the stub may be braced as shown in Fig. 3, Sheet 5.

The method of attaching guys to the guy stub is shown in Sheet 5.

No guys shall be attached to buildings, except where authorized by the superintendent.

In hilly country, place head guys so as to hold the downward strain of the line, as shown in Fig. 4, Sheet 2.

*Pole Braces.*—All poles having a side strain shall be reinforced against that strain where possible. In such cases the pole may be braced in the manner as shown in Fig. 5, Sheet 3. The joint is to be painted with a thick coat of metallic paint; use braces wherever it is less expensive than anchor guying.

*Double Pole Braces.*—In all cases where rock, quicksand, or other obstacles render the cost of the standard method of bracing or double sideing excessive, the pole may be double braced as shown in Fig. 6, Sheet 3, and as follows:

The braces are to be of sound cedar or chestnut, and not less than 18 inches in circumference at the top. The butts are to be large stone, or solid ledge, as shown on Sheet 3. "A" fixtures shall be double head guyed.

*Rock Guying.*—When convenient, anchor or side guys may be attached to solid rock, as shown in Fig. 5, Sheet 6.

*Line Guying.*—On a line containing one cross arm, head guy only as hereinbefore specified.

On a line containing two cross arms, and more than ten wires, double head guy and double side guy every mile.

On a line containing three cross arms, and over twenty wires, double head guy and double side guy every half mile.

On a line containing four cross arms, and over thirty wires, double the guys on corner poles, double side guy every quarter mile, double head guy every half mile, and use additional side guys where necessary.

"A" fixtures and braces shall be considered equivalent to side guys.

Additional reinforcements may be used wherein the judgment of the superintendent it becomes necessary.

All work shall be covered by a special estimate which will carry all detail information as to kind of wire and size of same, number of circuits, etc.

Approved: A. B. Dungan, Chief Engineer. W. H. Wilson, General Manager.

# History of the Automatic Telephone*

By Arthur Bessey Smith

*Assistant Professor in Telephone Engineering, Purdue University.*

As previously stated, during the busy portion of the day all calls from Main (manual) to South (automatic) are trunked directly from the "A" operators at the former to "B" operators at the latter office, and that these "B" operators have access to the subscribers' lines. Fig. 96 gives the scheme of a complete connection from manual to automatic. At the left is the calling end of a Kellogg subscriber's operator's cord, with the usual calling supervisory relay, *C. S. R.*, and calling control relay, *C. C. R.*, the former feeding positive battery to the tip, the latter negative battery to the sleeve.

Each "A" operator has access to the multiple of a number of

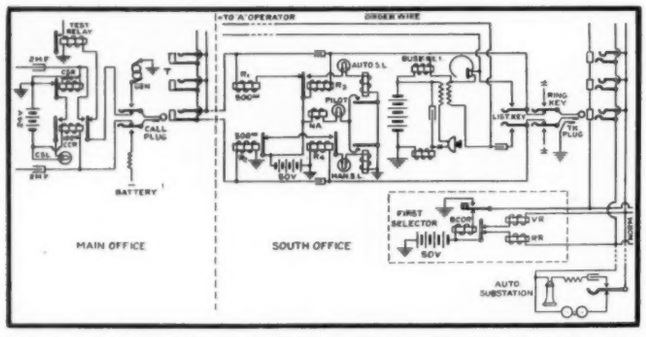



**Fig. 96. Circuit Set-up for Day Trunking, Manual to Automatic, Los Angeles.**

outgoing trunks, *T*, leading to the South office. The sleeve of each trunk is permanently tied to earth through the retardation coil, *R*. The tip line is normally connected through retardation coil, $R_2$. The tip line is normally connected through retardation coil $R_3$ and the back contact of relay $R_3$ to 50 volt battery. Two 2 m. f. condensers separate the trunk into two parts. The tip of the called end receives negative battery through the winding of relay $R_3$, while the ring gets ground, or positive, battery through the winding of relay $R_4$. The talking circuit runs through the regular listening and ringing key to a three conductor plugs, whose sleeve is connected "dead" to ground. The operator's set is like the ordinary common battery set, except for the connection of a high resistance retardation coil, *Busy Ret.*, between negative battery and the point between the receiver and secondary of the induction coil. This is for the busy test. The subscriber's multiple consists of banks of 3-conductor jacks, whose tip and ring are tapped to the vertical and rotary normal lines and the sleeve to the private normal of the automatic subscriber.

Let us trace a call through for the purpose of making the action clear. The subscriber at Main office calls central as in any manual common battery exchange and gives the number to the operator. Finding that it is for the South office the "A" operator presses an order button and gives the number directly to a "B" operator in the South office. The latter assigns the trunk. The "A" operator then makes the busy test on it, touching the tip of the calling plug to the sleeve of the jack. If free, there is no current flowing through $R_2$, hence the sleeve will be at ground potential, which is the same as that of the busy relay of the "A" operator.

Finding the line free she plugs in. At once negative current from the 24-volt battery flows through the calling control relay, *C C R*, to sleeve, along sleeve trunk to South office and through $R_2$ to ground. At the Main office this pulls up the calling control relay, *C C R*, disconnecting the busy test relay and closing up the tip side of the cord circuit. At the South office $R_2$ pulls up and breaks its contact. The current flowing through $R_2$ changes the potential of all the sleeves of this trunk at Main office, so that any other "A" operator will get the busy test on attempting to use it. At the South office the back

*Continued from issue of March 13, 1909.

contact of $R_2$ feeds negative battery at 50 volts through $R_1$, tip line to Main, calling supervisory relay, *C S R*, to ground. This keeps the calling supervisory lamp, *C S L*, from lighting.

The "B" operator at the South office tests the called line by touching the tip of the trunk plug to the sleeve of the multiple jack. Here the non-busy condition is full negative battery, 50 volts from ground, the positive battery terminal being grounded.

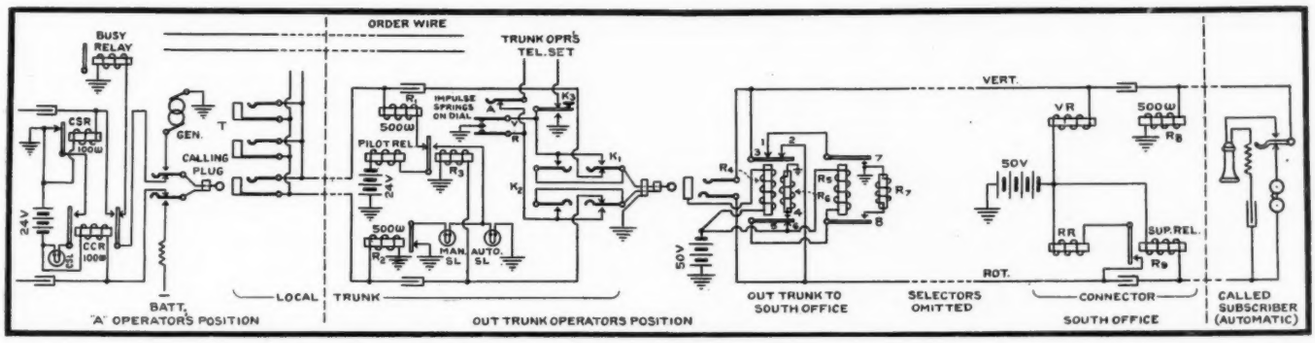



**Fig. 97. Connections for Night Trunking, Manual to Automatic, Los Angeles.**

Since the operator's receiver is wired through a retardation coil to negative battey no current can flow. But if the called line is occupied, the private normal will be grounded, hence current will flow through the operator's receiver giving the busy click.

Finding the line free she inserts the trunk plug in the subscriber's jack. The sleeve of the plug puts "dead" ground on the private normal of the called line's first selector, which operates its bridge cut off relay, *BCOR*, cutting off battery and clearing the line for ringing. This ground on the private normal also protects against other automatic switches.

The automatic substation set was wired as at Dayton, Ohio, with the exception of a condenser, which was cut in series with the receiver as shown in the drawing at the right. On the insertion of the trunk plug current flows from ground battery through $R_3$, ring of trunk plug, one side of line to subscriber's set, through the bell, back on the other line wire to tip of plug, through $R_3$ to negative battery. This energizes both $R_3$ and $R_4$. $R_4$ makes its contact, but as $R_2$ is energized it does nothing. $R_3$ pulling up switches battery from $R_1$ to the automatic supervisory lamp, *Auto. S. L.* This de-energizes the calling supervisory relay, *C. S. R.*, at Main office, lighting the calling supervisory lamp, *C. S. L.*, so that the "A" operator knows that the connection is established. The lighting of the automatic supervisory lamp at South office serves as a ringing lamp to the "B" operator, who rings the called subscriber with a manual key.

When the automatic subscriber answers, the bell is cut out and the receiver with its secondary and condenser cut in. The latter at once stops the flow of current, allowing both $R_3$ and $R_4$ to fall back. The latter causes no change. $R_3$ switches negative battery from the automatic supervisory lamp (putting it out) to $R_1$, thus energizing the calling supervisory relay at the Main office and putting out the calling supervisory lamp, *C S L*. Thus both operators are notified that the called subscriber has answered.

When through, the automatic subscriber hangs up. This lights both the automatic supervisory lamp, *Auto S L*, at South office and the calling supervisory lamp at Main. The Main operator pulls down the connection which lets $R_2$ fall back, giving battery to the manual supervisory lamp, *Man. S L*, since $R_4$ is again energized by the current through the subscriber's bell. Seeing both lamps lighted, the "B" operator pulls down the trunk.

The arrangement for night trunking from Main to South is shown in Fig. 97, which gives the apparatus in the former office. Special trunking positions are provided at one section of the board, and each position is equipped with part of the total number of trunks to the South office. Multipled in front of all the "A" operators in the Main office are local trunks, *T*, leading to the special trunking position, the total number of trunks being divided among the different positions. The order wire attached to the head telephone of each trunk operator is multipled to the order buttons of part of the "A" operators. At the left in Fig. 97 is the calling end of a Kellogg cord circuit with the usual equipment. The tip of the local trunk, *T*, runs through the retardation coil, $R_1$, back contact of relay $R_3$, pilot relay to negative battery. The sleeve goes through relay $R_2$ to ground. On the automatic side of the condensers the tip line has no normal connections. The ring side is connected through $R_3$ to ground. The latter may be called the supervisory relay of the trunk, since it not only operates the supervisory lamps at the trunking section, but also repeats the automatic supervision to the "A" operator.

The outgoing trunk is equipped with two relays, $R_4$ and $R_5$. The former is a cut-off relay and is quick-acting. Normally its main spring, 3, with back contact, 2, keeps the circuit "dead short." $R_5$ is slow acting and has for its function the grounding of the lines through its contact 7.

On receiving a night call for the South office the "A" operator, by means of an order wire, repeats the number to one of the out trunk operators. The latter assigns the local trunk, *T*, to be used, into which the "A" operator inserts the calling plug of the cord circuit which she is using. In the sleeve side, the calling control relay, *C C R*, at the "A" position, and $R_2$ at the trunking position pull up. In the tip side, ground battery through the calling supervisory relay, *C S R*, at the "A" board flows over the trunk, through $R_1$, pilot relay to negative battery. In consequence of this the calling supervisory lamp, *C S L*, does not light.

The trunk operator at the same time selects a trunk to the South office and plugs in. The sleeve of plug carries ground, which causes $R_4$ to pull up, thereby removing the short circuit from the line. At the same time main spring 5 closes with contact 4, causing $R_5$ to pull up, the latter locking in position through its own contact 8 and the retardation coil $R_7$.

The trunk line ends in the South office in a second selector, it not being necessary to go through a first selector, since the function of the latter is to pick out the office. The second and third selectors and connectors used for incoming calls were installed as a separate trunking section in the switch room of the South office. They were of the trunk release type.

After plugging into the trunk to the South office, for a moment current will flow from the second selector over the rotary line to the ring of the local trunk plug and to ground through $R_3$. This pulls up and lights the automatic supervisory lamp, *Auto. S. L.* The "B" operator throws key $K_1$, which cuts off the circuit behind and connects the operator's dial and telephone set to the outgoing trunk. This gives a clear line over

which to signal and operate successively the second selector, third selector, and connector at the South office. The contact *A* opens while the dial is being turned, the same as in a regular automatic substation.

In Fig. 97 the selectors have been omitted and a bare skeleton of the connector and called station shown. When the called

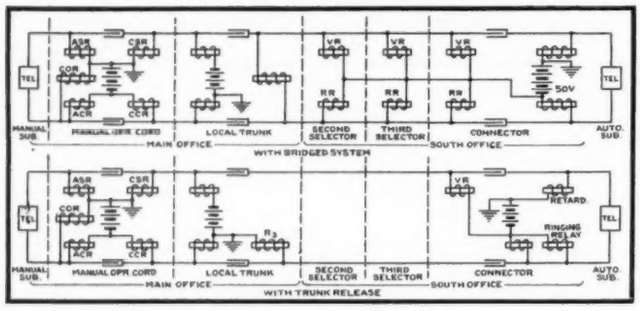



**Fig. 98. Talking Conditions of Night Trunking Circuit, Manual to Automatic, Los Angeles.**

station has been selected, the operator presses the key $K_3$, which grounds the vertical line and rings, after which $K_1$ is released, closing up the tip-vertical line. Subsequent ringing may be done by the listening key, $K_2$, and the ringing key $K_3$. While waiting for the called subscriber to answer, the connector feeds battery current through the 500 ohm retardation coil, $R_8$, and the supervisory relay, $R_9$, to the bell at the called station. $R_9$ pulls up, connecting the rotary relay, *RR*, and negative battery to the rotary line. This feeds current to $R_3$ at the Main office energizing it and lighting the ahtomatic supervisory lamp, *Auto. S. L.* When the automatic subscriber answers, the condenser in the telephone circuit stops the flow of current, letting $R_9$ and $R_3$ fall back. This puts out the automatic supervisory lamp, notifying the "B" operator that the called subscriber has answered. It also feeds negative battery through $R_1$ to the calling supervisory relay, *CSR,* in the manual cord, energizing the latter. This extinguishes the calling supervisory lamp. *CSL,* and gives notice to the "A" operator. The pilot relay will not energize through the 600 ohms to which it is connected.

When the conversation is completed, both subscribers hang up. The calling (manual) subscriber lights the answering supervisory lamp as usual. The called subscriber (automatic) by hanging up closes the circuit through his bell, thereby energizing $R_9$ in the connector. This closes battery through the rotary relay to the rotary line which pulls up $R_3$ at the Main office. On pulling up, $R_3$ lights the automatic supervisory lamp which lets the trunking operator know what has happened. When the armature of $R_3$ breaks away from its back contact, it cuts battery

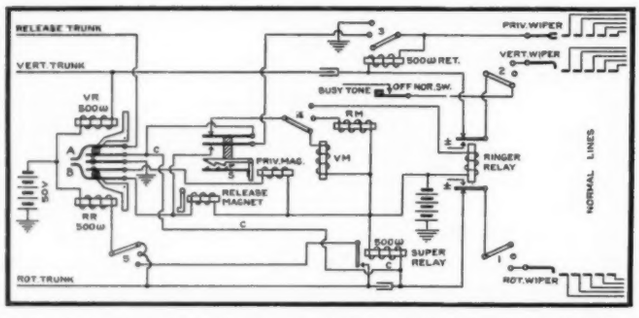



**Fig. 99. Supervisory Connector with Trunk Release, South Office, Los Angeles.**

off the tip wire, allowing the calling supervisory relay on the "A" operator's cord circuit to fall back, lighting the supervisory lamp. Thus both operators have simultaneous notice that the automatic subscriber has hung up.

When the "A" operator pulls down the connection she causes $R_2$ to fall back, lighting the manual supervisory lamp, *Man. S. L.* Seeing both lamps lighted, the trunking operator removes the local trunk plug from the outgoing trunk jack. The simple removal of the plug from the jack causes the release of the automatic switches in the South office as follows: The sleeve of the trunk plug, carrying ground, has been the means of holding up $R_4$ The latter now falls back quickly and short circuits the vertical and rotary lines at 2 and 3. Since contact 7 on $R_5$ is still made, this grounds both lines. The armature No. 5 has meantime swung away from contact 4 (ground) and now touches 6, which is negative battery. This places a "dead short" on relay $R_5$, so that it starts to fall back rather slowly. When it has fallen back, contact 7 opens, removing the ground from the lines. This completes the release of the automatic switches in the South office.

It is interesting to notice the new circuit which this trunking gives us for talking. This is shown in Fig. 98. The upper diagram shows the conditions which would have existed if the bridged system had been used. The lower shows the Los Angeles condition, due to the trunk release. Counting the relays on the manual cord circuit there would be eight bridges across the line, in addition to the cut-off relay, *C.O.R.,* of the manual subscriber, which goes to ground. By the trunk release this is made only five bridges, plus the cut-off relay and $R_3$ in the local trunk.

The second selector in which the trunk line terminated in the South office was like those used by the South office subscribers (See Fig. 93, Telephone. Vol. 17, No. 11, Page 303), except that the 100 ohm resistance at the release magnet was omitted, together with the release trunk to which it fed current. The

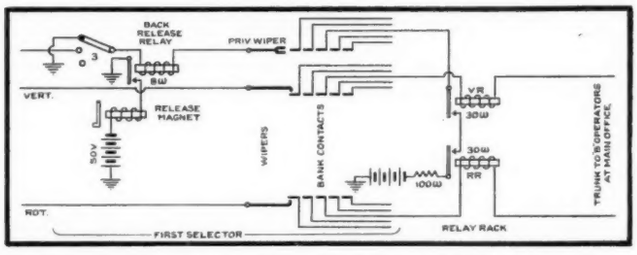



**Fig. 100. Outline of Trunking Circuit, Automatic to Manual, South Office, Los Angeles.**

third selector was like the ordinary second selector, arranged for complete trunk release.

The supervisory connector used on this scheme of trunking was wired as shown in Fig. 99. It is of the full trunk release type and feeds release current back to the third selector through the special front release springs, *A B,* and the release magnet itself is utilized to limit the flow of current instead of a special resistance. The supervisory feature consists of the 500 ohm supervisory relay feeding negative battery to the rotary called line and a 500 ohm retardation coil from the vertical line to the private wiper. In the talking position this fed positive or ground battery to the called subscriber.

The supervisory relay has one contact, which controls the connection of the rotary relay to the rotary line. This operates the supervision at the manual board, which was above described. The wire *C.C.C.* was put in to balance the two sides of the talking circuit with respect to ground. It connects the ringer relay to the rotary line, which without it would have only one inductive leak to earth. It must be remembered that in dealing with the talking qualities of telephone circuits the impedance from the two sides to earth must be as nearly equal as possible. And as far as inductive balance is concerned the retardation coils may as well be connected to negative battery as to ground since the characteristics of alternating current is not affected by passing through battery. It acts as a very low non-inductive resistance. This accounts for the presence of the ringer relay connected to the rotary line in Fig. 98, lower sketch.

Mention has been made in the previous chapter of the method of handling calls from automatic to manual. The automatic subscriber merely pulls "one" on the dial, which raises the wipers of his first selector up to the first level and selects a non-busy trunk to a "B" operator at the main switchboard. Since the first selector is trunk release, the vertical and rotary relays are cut off when the side-switch slips into its third position. This leaves the subscriber without means of releasing. To obviate this difficulty each trunk line to Main was provided with two special series release relays, installed on the relay rack in the South office. They are wired as shown in Fig. 100. Each relay is wound to 30 ohms resistance and has a copper sleeve over its iron core, so that it offers as little impedance as possible to talking current. Running from battery to the contact of the rotary relay, *R. R.*, is a 100 ohm resistance. The release line is continued through the contact of the vertical relay, *R. R.*, to the private banks of the first selectors. On release, both relays pull up simultaneously and operate the release magnet through the back release relay over the release trunk.

Since the first installation described in these two chapters additional exchanges have been put in, all automatic, following the scheme of ultimately covering the entire city with automatics as fast as traffic calls for increased facilities. The problems brought out by the multiplicity of offices and long trunks have called for additional inventions, which really come later in the logical development of the history.

*(To be continued.)*

# Handling the Storage Battery

## By Louis Rosenberg

Mention the words "Storage Battery" to most wire chiefs or storage battery attendants and immediately their confident and pleasurable expressions become sad, resigned and blank stares. The storage battery seems to be a sort of "bug-a-boo"—a wild, mysterious and uncontrollable monster—from which they shrink in awe and fear.

Yet, if it required any special knowledge or a technical education to handle a storage battery properly, it is doubtful whether it would be used so universally. Certainly, if such were the case, the telephone interests throughout the country would safeguard the vast sums of money involved in this part of the equipment by employing technical men.

It is not difficult to handle a storage battery properly, nor is it hard for any one with ordinary intelligence to understand enough of the principles of a storage battery to handle it intelligently. That these statements are true, you shall see presently, for this paper will be devoid of theory and technicalities, and will concern only the one case, "The operation of a storage battery as used in the telephone business."

Any two dissimilar metals immersed in an acidulated solution of water constitute a current-generating device, called an "electric cell." The strength of current depends upon several factors, the most important ones of which are the nature of the metals employed, the acidity of the solution, the resistance of the entire circuit (internal and external), etc. Several of these cells used together are spoken of collectively as an "electric battery," or simply "battery."

In all electric cells a chemical action—a change in the nature of the materials—takes place, and as a result of this chemical action, *and accompanying it*, an electric current will flow through an external resistance connected to the plates.

This change in the nature of the elements of the cell may take the form of simply coating the plates, or of dissolving them (one or both), or of conversion into entirely new substances. However, some change must take place in order to generate a current.

If the elements or plates of the cell undergo such a change that they *cannot* be restored to their original state by the application of a current from some external source, after the cell has ceased to deliver current, the cell is designated a "primary" cell.

If, on the other hand, the cell can be restored to its original current-generating ability by the passage of a suitable external current through it, the cell is called a "secondary" or "storage" cell.

As an illustration of a primary cell might be mentioned one in which the elements are a plate of zinc, a plate of copper and a dilute solution of sulphuric acid. After the chemical action ceases, no more current will flow, and application of an external current does not restore the plates to their original condition.

However, if we substitute for the copper and zinc plates, others of lead peroxide and pure lead, an external current applied to such a cell after it ceases to generate current will restore the plates to their original condition, and the cell will again deliver current. This cell is a "secondary" or "storage" cell.

Thus, it is seen that, in both cells, current is a result of the chemical action that takes place, and that the difference between the primary and secondary cell is that, in the former, the chemical reaction is not reversible; whereas, in the latter, it is reversible.

It should be carefully noted that no actual storage of current takes place, but that it is the chemical change produced by the external current restoring the plates to their original condition (thereby permitting the repetition of the first chemical change) that causes current to again flow.

This process of applying the external current to an exhausted secondary or storage cell is called "charging." And the function or duty of charging is to rejuvenate (restore) the plates to their original condition, which, in our case, consists in taking acid out of the plates which they absorb during discharge.

It has just been said that the plates absorb acid during discharge. The quantity of acid that they will absorb can be readily calculated from the consideration of the size and number of plates, so that, if some means were at hand to determine how much acid has been absorbed at any point during the period of discharge, we would have an indication of the state of charge of the cell at that time. It is necessary, therefore, to find some quick and simple method of determining the quantity of acid in the cell at any time.

Since the solution consists of a mixture of sulphuric acid and water, and acid is heavier than water, the mixture must be heavier than water. The more acid there is present, the heavier the solution.

Now, it is well known that it is much easier to float in salt water than in fresh water; this is because salt water is heavier than fresh water. So, too, a piece of iron will float in mercury, or quicksilver, as it is popularly called, whereas it will sink easily in water.

Therefore, it follows that, if a suitable object be so balanced that it will float in an upright position in a solution of one certain weight or density of liquid, this object will

rise and sink according as the solution becomes denser (heavier) or less dense (lighter), respectively.

The hydrometer is an instrument patterned on this principle, and is used for determining the density of liquids. If floats in an upright position, and is so designed that it rises and sinks a very appreciable amount with slight changes in density.

It follows, then, that there might be placed on this hydrometer two marks: one showing the density or weight of the acid as it should be before the charge is started, and the other the density or weight when the charge should be stopped. This gives the necessary indication for starting and stopping of charge.

It will be remembered that charging is a process of renewing the elements. Therefore, when most of the active material has been restored, further application of the current is practically useless; in fact, it is harmful, for it then attacks the grids and tends to convert them into active material. This, if carried continually too far, will ruin the plates and they will become rotted and break. Also, this overcharging—charging longer than necessary—is a waste of current.

On the other hand, discharging too much is very much more harmful. There is danger of the negative plate undergoing a certain chemical reaction, which impairs and even destroys its further utility, while the active material in the positive plates—the spiral buttons—expands to such an extent that the grids are broken and the plates ruined. These points will be considered more fully later on.

Therefore, it is of the utmost importance that the charge be started at the proper time and stopped at the proper time. Fortunately, these points of starting and stopping are determined for us by the manufacturer, so that the operation of a battery is really a very simple matter.

The condition of the battery as left by the installer after administering the first or "initial" charge, should be such that a hydrometer floating in the solution registers 1205, assuming that the temperature of the solution is 70 deg. Discharge is then started and should be continued until the hydrometer shows 1190, which is 15 points below the starting point.

The next or first "regular" charge is then administered, and should be continued until the hydrometer reads 1200—not the original 1205. Charging and discharging is then continued between these points—1190 and 1200—during a period of about six charges and six discharges, and the seventh charge is continued for a longer period of time until the hydrometer again reads 1205. The "regular" charges and discharges are again started, as above. If the exchange load is small and the battery does not discharge these 10 points in the course of one day, charging should be postponed until that drop in specific gravity is reached. Under such condition, if charging is done every other day, the overcharge should, of course, be administered every two weeks.

So far, the operation of the battery is very simple, and should be easily understood. There is one point, however, that may seem at first to be rather difficult, but which may be easily understood by all. This point is the correction that must be made to hydrometer readings if the temperature of the solution changes from 70 deg.

You all know that, as the temperature of a liquid rises, it will increase in volume. Therefore, if we have a vessel that contains and can hold only one cubic foot of liquid, and fill and heat it, part of the liquid must overflow. Now this cubic foot (of volume) of the liquid will weigh less at this higher temperature, because some of it has been lost by overflow. Note, however, that there is still one cubic foot of the liquid. Therefore, it follows that the liquid is less dense (has less weight) than it was before at the lower temperature, and a hydrometer immersed in it would sink lower than it did before.

So, too, if the solution had been cooled it would contract, and we would be obliged to add more liquid in order to keep the volume equal to one cubic foot. Adding more liquid makes the cubic foot of liquid heavier, hence more dense. Now the hydrometer would rise because the liquid is denser and therefore more buoyant.

You see, then, that it was necessary, in telling what the points of charge and discharge are, that the manufacturer state at what temperature these points were determined. And, since 70 deg. Fahrenheit is the general average temperature for the year, this was adopted as a standard. Therefore, if the temperature of the liquid is above 70 deg., the hydrometer sinks lower and consequently reads less than it would were the temperature of the liquid 70 deg.; and if the temperature is below 70 deg., the hydrometer will not sink enough, and thereby give too high a reading, so that suitable correction must be made to these readings.

It has been determined that, as the temperature of the liquid is 3 deg. above 70 deg., the hydrometer reads 1 point too low, and for 6 deg. it is 2 points low, etc.; also, if the temperature is 3 deg. below 70 deg., the hydrometer reading is too great by 1 point, etc. Hence, simultaneously with the hydrometer reading should be taken a thermometer reading, and correction to the hydrometer reading should be made accordingly.

A question might arise in your minds as to why many of the storage batteries you have seen do not show the original 1205 on overcharge. This need cause no alarm, for the specific gravity of a battery gradually diminishes with age and use. The loss of acid is caused by the spraying or "gassing," as it is called, when the battery is fully charged, and also by the fact that the sediment which collects in the bottom of the cells is discharged active material and therefore contains much acid.

Something of great importance to you is the source of the storage battery troubles and how to know when your battery is in trouble.

Some of the troubles which storage batteries most frequently suffer are loss of capacity, buckling and fracture of plates, and corrosion of the grids. The first two are caused by carrying discharge too far; the last, by the presence of foreign acids in the cell, such as hydrochloric or nitric.

Taking these up in the order named, loss of capacity is caused principally by sulphating, by the contraction of the active material in the pockets of the negative plates, and by the excessive formation of sediment—which is principally active material from the positive plates.

These three conditions are the direct result of over-discharge and may be recognized by the lighter color of the plates, the vacant spaces in the pockets of the negative plate as a battery lamp is passed down between the plates, and the amount of sediment collected in the bottom of the cell.

Over-discharge may be the result of carelessness in permitting the battery to discharge for too long a time without receiving a charge; or it may be caused by internal discharging, which, in turn, may be due either to the presence of metallic impurities in the electrolyte or short-circuiting of the plates.

There is no excuse for neglecting to charge a battery. If the battery shows indications of loss of capacity, internal short-circuits should be looked for and removed, and electrolyte should be analyzed.

Buckling and fracture of plates results from the fact that the grids cannot accommodate the expansion of the active material, which becomes too great as the discharge is carried too far. In this case, either the plate will become distorted or it will crack.

Nothing will be said here regarding the complete methods of treatment of cells that are in trouble as this is a proper subject for a new paper. We come, therefore, to the manner of detecting when a cell is in trouble, and this is, fortunately, an easy matter.

If, as the attendant makes his daily readings of the specific gravity (corrected for temperature) and voltage, he should find a cell whose readings are considerably lower than those surrounding it, that cell is in trouble. Also, if the cell should not gas as early and as vigorously as the others on overcharging, it is in trouble. Again, if no gassing takes place at the negative plate, the cell is in trouble.

In such cases the battery should be given a long overcharge, and if the cell is not then restored, give it another overcharge, after permitting it to discharge about one-half. If it is not then restored, this case should be referred to an expert.

In administering these overcharges, care should be exercised so that the temperature of the solution will not rise above 90 to 100 deg. Fahrenheit. These overcharges should be continued until four or five successive 15-minute readings of voltage and specific gravity show no further rise.

Finally, I want to say a word about keeping records. Most men in charge of batteries keep them, but some of these are not complete enough. Above all, a record should be kept constantly of the voltage, density and temperature of solution and room both at start and end of charge. With such a record, should trouble develop, it can be more readily traced and analyzed.

# The Michigan Convention

By R. D. Lillie

The twelfth annual convention of the Michigan Independent Telephone Association was held March 24 and 25 at Saginaw. While the doings of the legislators at Lansing required the presence there of many of the most active telephone men, who would otherwise have attended the convention, the meeting made up in enthusiasm what it lacked in numbers, and President Fisher voiced the sentiment of those present when he declared, just before adjournment, that the meeting had been one of the best that has yet been held.

A large part of the success of the convention was due to the efforts of the host, J. J. Speed ,of the Valley Home Telephone Company, of Saginaw, who provided an ideal meeting place for the members in the new auditorium, and entertained the members in such a way as to make their stay in Saginaw highly pleasant and profitable.

The work of the Association this year is to be useful in a new way, on account of the recent adoption by Michigan of a new constitution, and provisions in this affecting telephone companies, and particularly the provision as to obtaining franchises, will provide many new problems for telephone men, as was evidenced by the discussion of the subject during the second day's session.

The meeting was called to order Wednesday afternoon by the president, Hon. E. B. Fisher. The president first talked informally about the legislation pending at Lansing. In his annual address he reviewed the Independent situation somewhat as it is today, touched on the progress made during the past year, and called attention again to the fact that the telephone business seems to be one of the few activities that is in a very small measure affected by a panic, which fact helps to establish the value of telephone securities as an investment. He also dwelt on the work of the International Association in getting the rights of the Independent telephone companies established by the courts where necessary, and the importance of this work to the Michigan Association.

The speaker went to considerable length also to urge upon the members to provide reliable statistical information when called upon by government authorities and others to do so, and for advertising purposes, and pointed out that had the proper parties been in command of the necessary statistics showing the growth of the Independent telephone movement earlier, long distance connection with Chicago, which he deemed to be assured now, and which would open up connection between the East and the West, would have been brought about much earlier. The information was not at hand when first wanted. In concluding, the president said:

"General conditions are increasingly favorable for us. Our popularity with the public is increasing where we are doing our duty by the public. We have every incentive to do our best, both as to character and quantity of service. We have reasonable prosperity. Our outlook for the future is flattering."

The roll call is always a feature of the Michigan Association conventions, and the roll call this year was of particular interest, as the companies reported themselves to be in excellent condition, having made substantial gains, where there was room for growth, during the past year.

W. O. Hunt, answering for the Adrian Telephone Company, by his report, showed the effect of the present legislative activity on the telephone business. He reported that in Lenawee county his company had during the past year, the best business that it had ever had, and that $100,000 had been provided for, and men practically engaged to begin work on, a new plant at Adrian. "I expected to be able to report to you," said he, "that the work was now in progress, but when we saw what is being done at Lansing, we called a halt. May be we'll build this year, and may be we won't. We'll see what the legislature does."

Mr. Fisher, reporting for the Citizens Telephone Company, of Grand Rapids, in the absence of General Manager Tarte, said that the company had received a net increase of 106 orders during the first 23 days of the month, and 254 orders since the first of January, at the Grand Rapids exchange. "Sales of stock during the past 90 days have been almost in the volume of anti-panic conditions. More than $90,000 worth of stock was sold during the first 90 days of this year."

A. A. Burch, of the Citizens company, of Battle Creek, reporting for his company and the Banfield, Marshall, Lacey and Ida companies, reported gains. In Battle Creek, 375 telephones had been added to the list, without employing solicitors; at Banfield, a gain of 76 telephones, with 75 waiting for service; at Lacey, an increase from 57 to 127, with 40 on the waiting list. Augusta is for the first time equipped for Independent service.

C. R. Kehoe, for the Citizens company, of Jackson, reported a small gain.

The Citizens company, of Muskegon, reported constant progress, and that it intended soon to rebuild its plant and put in the most up-to-date type of apparatus. The new exchange at Coopersville has shown an increase of 11

per cent during the past year. The company has paid dividends from the first.

D. G. Kennedy, for the Grand Ledge Telephone Company, reported an increase from 330 to 550 telephones, with the territory almost completely covered. "We spent $10,000 last year and expect to spend the same amount this year in improving our plant. The competing company has had five solicitors in the field lately, but with apparently little effect."

S. E. Fisher, for the Home Telephone Company and the Interstate Long Distance Telephone Company, both of Detroit, had very favorable reports. "The Home company," said he, "has about 12,000 telephones in operation today. The outlook is better now than at any time during the past six months." For the Interstate company he reported an increase in the toll lines, mentioning the extensions to Flint, Lansing, Ida, and the river front district. Nelman F. Wing, of Grass Lake, reported 345 telephones as against 3 Bell telephones; at Homer, 530 telephones against 3 Bell telephones, the latter being a gain of 33 1/3% over the 2 telephones of last year, as the manager humorously put it. A representative of the company at Morenci reported a gain of about 50 per cent, making nearly 600 telephones. This is a village of about 1,400 inhabitants, 280 residence telephones, making one telephone for every five of the population. The report concluded: "We never neglect to give our stockholders 2½% quarterly dividends."

C. W. Swaverly, for the Swaverly Telephone Company, Kalkaska, said: "We had a fire the past year which set us back temporarily. The Bell situation is not troubling us. I am busy minding my own business. We are in need of toll lines more than anything else."

F. M. Howard, for the Southern Michigan Telephone Company, said: "We have increased our telephones to 900. Territory well covered."

L. L. Conn, for the Union company, said: "Made a gain during the year of 456 telephones, making a total of 8,598 telephones in service. Our company has not issued any stock since August 1, 1907, but an issue has now been authorized of $25,000 at five per cent above par. We have had some unavoidable litigation during the year, but have been uniformly successful."

J. J. Speed, for the Valley Home Telephone Company, invited the members to go to the plant and see for themselves. "Last year at this time we had 1,600 telephones. We have now passed the 3,000 mark, and we are still going, and will have 4,500 before the first day of January next year. We are beginning to get the cream of the business, too."

C. B. Hall, for the Washtenaw Home Telephone Company, Ann Arbor, reported that between 650 and 700 new telephones had been installed during the year, which made about all the company could at present take care of.

C. H. Rauch, for the Wayne County Telephone Company, said: "We have been gradually increasing our subscribers, paying dividends and have a list of business men who will buy stock when we want to sell it."

F. E. Rice, of the Millington Rural Telephone Company, reported that because it has become necessary to raise the rates of his 350 users from $10 to $12 a month, a cut-rate mutual company is threatened, and ways and means were discussed of how best to advise the promoters of the new company of the cost of operating telephone lines, etc.

Through the activity of Mr. J. J. Speed, a large gathering of Saginaw people met with the telephone men in the evening in the main hall of the auditorium. The mayor, Hon. Geo. W. Stewart, M. D., gave an address of welcome. In responding, the president, Mr. Fisher, among other things spoke of the fact that at the time the Independents broke the monopoly in Michigan there were but 13,000 telephones in the state, while after 15 years of competition there are now 220,000 telephones in use. An excellent program of entertainment was provided, after which the crowd adjourned to the small hall where a "Dutch" lunch had been provided for the visitors. The festivities lasted till near midnight.

The last day of the session was devoted to the reading of papers and their discussion.

The first paper was by S. E. Fisher, on "The Relation of the Small Telephone Company to the Large," and he emphasized not only the fact that the large companies, without the expense of the smaller companies, were constantly spending large sums of money in fighting hurtful legislation, in extending toll lines, etc., and that the small companies, on the other hand, were increasing the number of telephones in use in the villages and smaller cities, making more prospective users of toll service. "Therefore," said he, "the large and small companies should work together. A house divided against itself must fall."

The paper of A. H. McMillan, on "Telephone Legislation," was particularly appropriate, as it dealt not only with the present legislation, but also with the effect of the new constitution on the status of telephone companies, and Mr. McMillan was kept busy for a long time answering questions that occurred to members, some of whose companies have franchises and some who have not, and who want to make extensions. The new constitution requires all companies now to obtain a franchise before entering a new field. If the council or town board will not grant it, the question may be submitted to the people. But apparently, the decision, whether it is to be submitted to the people or not, will depend entirely on the will of the council or township board. The referendum clause was apparently entirely overlooked, and where the companies will find themselves is an interesting question. The Independents, however, it was agreed, have much the best of the situation in Michigan, as compared with their competitor, for although under the old constitution telephone companies were not required to obtain franchises—and the Bell company seldom went to the trouble to ask for franchises—the Independents made it a rule always before entering a new field to ask for a franchise, and usually got it, with the result that having vested rights, which the new constitution preserves, they are already in on the ground floor. But one of the new problems to be decided by each manager is, even though he has a franchise, whether he can make an extension of his line without getting a new franchise for each extension. The general opinion seemed to be that he would be obliged to do so, even though the town board gets high handed.

J. J. Speed's paper dealt with "Telephone Accounting." Mr. Speed went at some length into the matter of having a proper classification of accounts, saying that the larger the company the more elaborate the classification should be. He spoke somewhat of the forms used, mentioning his voucher check, a valuable idea, and recommending the loose leaf system for the ledger. He spoke of the benefits of an exchange of forms between members to spread new ideas.

L. L. Conn's topic was "Advertising Long Distance Business." Taking as a starting point the fact that when people used to think of long distance telephone service they invariably thought of the Bell, mostly because it was advertised as such, he dwelt on means of bringing to the people the idea that the Independent telephone system is not a number of scattered Independent companies, but one vast system.

"The great trouble", said he, "is that each Independent company advertises its own long distance service instead of the service of the Independent long distance system. To get the best result, all individual advertising must advertise

the whole system." He spoke of the step in the right direction that had been made by the International Association in adopting the Shield, and what could be done by advertising on calendars, directories, etc., as the railroads do. "But the time is not far distant," said he, "when the Independents must raise funds for a campaign of newspaper and magazine advertising, if for nothing else than to combat our competitor's extensive advertisements claiming mismanagement on our part. Each company should pay its pro rata of the cost, and the International Association should have a department of publicity, supported by the state associations, in charge of an expert advertising man. No other commercial enterprise would furnish topics of such absorbing human interest for the advertiser. When the story has been rightly told, the public, when in need of long distance, will not forget to 'Look for the Shield.'"

C. E. Smith, in "A Study of Long Distance Traffic," showed very forcibly how it was the duty of the manager, after the plant was built and local business well taken care of, to bend his energies to developing the long distance business and see that the long distance lines are working to capacity, and that calls are not being lost from failure of co-operation. "If we can get ourselves established in the long distance field, we are sure of success. If any part of the long distance service is weak, the whole system is weak. You have been building large expensive plants. Develop this part of the business, and it will add 25 per cent to your present investment."

Long distance traffic as usual created a great deal of discussion, and numerous instances were cited where people had been induced to put in telephones simply because others in other cities had tried to get into communication with them and couldn't because they did not have telephones.

The next topic, that of "Coupons—Their Necessity and How They Can Be Handled Equitably," by F. M. Howard, also proved to be a lengthy topic of discussion. Mr. Howard's claims that the universal use of coupon books would result in a great increase of business were heartily agreed to by all present, the only question seeming to be as to the best way of handling them. It seemed to be agreed, however, that it was best to have it done through the traffic association, and this association at its next meeting is to take up the subject. Some of the companies, it was reported, operating in Michigan, are now using coupon books, giving 10 to 15 per cent discount on large sales, but occasionally there is some difficulty in using the books interchangeably with other companies outside the state. Most of the members expressed themselves as in favor of a universal coupon book, clearings to be made through a national traffic association.

Some of the members pointed out that as the system works out at present, if a local company issues coupon books, at a reduced rate, some of the connecting lines will refuse to join in the reduced rate, with the result that after their share of the charge has been deducted, it leaves little or nothing for the original company. The subject is to be left with the traffic association.

Messrs. H. H. Ide and Wm. Robinson, who were to have read papers, were unable to do so.

The officers of the Association were re-elected, namely, E. B. Fisher, Grand Rapids, president; W. S. Vivian, Grand Rapids, secretary, and A. C. Himebaugh, Burr Oak, treasurer. The executive committee is yet to be appointed.

The traffic committee consists of S. E. Fisher, Detroit; C. E. Tarte, Grand Rapids; W. J. Melchers, Alma; A. C. Himebaugh, Burr Oak; H. P. Gibbs, Saginaw; W. S. Robinson, Muskegon, and I. C. Bausch, Cleveland.

The officers of the traffic association are C. E. Tarte, president; W. S. Vivian, secretary, and A. C. Himebaugh, treasurer.

The manufacturers were well represented at the convention this year, the large auditorium supplying excellent facilities for exhibition purposes.

The entertainment committee desires, through the columns of TELEPHONY, to make acknowledgements to the following firms who contributed to the "Dutch Lunch," which was a feature of the Wednesday evening meeting: W. G. Nagel Electric Company, National Carbon Company, Electric Appliance Company, Durant Electric Supplies Company, Dean Electric Company, Miller Anchor Company, Kellogg Switchboard & Supply Company, Belden Manufacturing Company, Litscher Electric Supply Company, TELEPHONY, Stromberg-Carlson Telephone Manufacturing Company, Monarch Electric Manufacturing Company, Homer Roberts Company, Milwaukee Telephone & Manufacturing Company, American Electric Fuse Company, American Electric Telephone Company, F. B. Cook, Everstick Anchor Company, K. B. Lockout Manufacturing Company, Indiana Steel & Wire Company, North Electric Company, Monarch Electric & Wire Company, Julius Andrae & Sons Company, F. Bissell Company.

## An Operating Man's Experience With Pole Preservation.

*(Concluded from Page 388.)*

the moisture and atmosphere to the very heart. My experience has been that little value can be placed on old poles for resetting. At one time I purchased several hundred white cedar poles from a telegraph company. They had served in the telegraph line for fifteen years, and had been chopped off at the ground line. I paid but a few cents per pole and at first imagined I had struck a great bargain. However, when we came to resetting them in a telephone line, we discovered they possessed very little value. Aside from the ravages of the weather and ordinary decay, many poles had been damaged by wood-boring insects, squirrels, and wood-peckers. Boiling the pole in hot creosote sends the oil into all the checks, cracks and crevices where it is most needed, the fungus-poison permeating the cellular and inter-cellular spaces of the wood, assisting the pole to withstand the ravages of the weather, decay and wood-boring insects and birds. The small additional expenditure occasioned by dipping the entire pole will, I believe, prove to be a wise investment.

Another consideration that may possess some value is that, after the pole has been set, there will be a tendency for gravitation, and the erosion caused by rain, to carry the creosote poisons toward the base of the pole, where the wood destroying fungi are most active. And further, I believe that the treatment with oil will do much to preserve the strength of the poles. A line of telephone poles is subject to severe side strains and much of the loss occasioned by sleet storms is due to the poles being unable to withstand the side strains caused by heavy wind blowing against the ice covered wire. Anything that will assist in preserving the strength of the pole will be of a great value.

The open tank process possesses many advantages over the brush treatment. The heat of the preservative expands and expells a portion of the moisture and air contained in the cellular and inter-cellular spaces of the wood fiber, so that, by keeping oil at a temperature of over 250 degrees Fahrenheit, most of the moisture in the wood, near the surface of the pole, is converted into steam and driven off. When the pole is first placed in the hot preservative, the steam coming out of the wood causes the oil to foam considerably, but at the end of ten minutes little or no steam can be observed to come from the pole, and this indicates that the wood is well prepared for absorbing the preservative. Considerable oil, of course, has entered the wood by capillary attraction, but the most effective impregnation takes place as the pole is removed from the bath. As

the pole comes in contact with the cold air, practically all the oil adhering to the surface is drawn into the wood. As the partial vacuum formed by the expansion of the air in the cellular spaces in the wood tissue is destroyed when the pole cools, the liquid is forced by atmospheric pressure into the wood. While the amount of oil thus absorbed is small, yet the preservative taken up has actually impregnated the wood tissue where it will be most effective in protecting the poles against disease.

One good feature of this process is that it leaves the poles in nice shape for handling. Pole setters and linemen report that they are not troubled by oil getting on their hands and clothing, and that the poles handle as nicely as if they had not been treated. In fact the linemen say the treated poles are not so treacherous to climb as those that have not been treated, because many of the untreated poles have a hard glazed surface that dull "hooks" do not readily enter, and the hot oil softens these surfaces.

Some care must be taken when fresh oil is to be heated. When a temperature of 212 degrees is reached, the oil begins to foam, due to the presence of moisture, and, unless the heat is applied carefully, there is danger of the oil boiling over. But as soon as the water has passed off, the temperature may be increased. There is considerable loss in heating oil in the open tank, due to the volatilization of the light oils, since as these oils do not remain in the timber, but soon volatilize in the presence of sunshine and air, they possess little value and might as well be gotten rid of at one time as another. Circular 98, of the Forest Service concludes that "the light oils boiling below 205 degrees Centigrade will not remain in the timber, but that heavy oils, containing a high percentage of Anthracene oil, will remain almost indefinitely, and protect the wood from decay and boring animals." It would seem that an important requirement of good creosote oil would be that it contain a minimum content of the light, low boiling oils.

Some seven or eight years ago, an electric light company, in a small Iowa town, undertook to preserve the butts of the poles it used by giving them a brush treatment of hot tar. The tar used was the heavy by-product from the manufacture of water gas, which is commonly used as a roofing tar. The writer recently examined these poles, and would conclude that the coating of tar had actually hastened decay. The tar had formed a shell or coating behind which water had lodged. The moisture probably entered from above, following the openings made by checks. Many of these poles, after only eight years' service, were decayed so badly as to render them unsafe to climb. Untreated telephone poles set in the same streets two years previous show less decay than the treated lighting poles. From this it would appear that a treatment that fails to penetrate the wood fibres not only fails to preserve the timber, but actually hastens decay.

# Construction Reports

**Notes on Recent and Proposed Construction as Told by the General Managers of Operating Companies and Gathered by Our Correspondents in the Field**

The Keystone Telephone Company, of Philadelphia, Pa., this year will probably lay about 200,000 feet of conduit the material for which has already been purchased. Some rural lines have recently been constructed, and more will be built during the summer. At the present time a building for a repair shop, cabinet shop and store house is being put up, to be three stories high, adjoining the present building at Sixteenth and Summer streets. The architecture of this building is the same as the exchange building and the walls are heavy enough so that if it is ever desired to extend the Race exchange two more stories can be added to the building. Two or three small plants will be built in the suburban district of the company. General Manager Wilson estimates that the company's earnings this year will run between $250,000 and $300,000 above fixed charges, and a large part of this can be used for construction, if necessary. However, there is spare switchboard capacity, and the construction work of the company this year will probably not exceed $250,000. It is estimated that the station growth will call for about 4,000 new telephones.

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The Frontier Telephone Company, of Buffalo, N. Y., which is operated by the Federal Telephone & Telegraph Company, will make extensions to its lines which, this year, will amount to about $200,000. Contracts for telephone service are coming in very rapidly, and it is anticipated that the yearly increase will be from 2,500 to 3,000 telephones.

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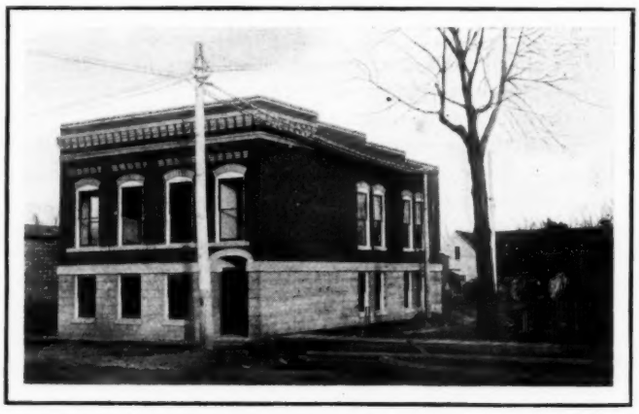
Many improvements have been made by the Citizens' Telephone Company, of Terre Haute, Ind., and many more are contemplated for this year. More cables will be strung and a number of extensions will be made. It is hoped to greatly increase the number of subscribers.

The Clarence Telephone Company, of Clarence, Mo., is completing improvements which were started last August. Since that time nearly 8,000 feet of cable has been installed. A new pressed brick and concrete exchange building was built at an expense of $4,500. A new switchboard of the latest type was installed with the necessary cross connecting rack and lightning arresters; also all new outside protection.

This season about 3,000 feet of cable will be strung in



**Exchange Building of the Clarence Telephone Company, Clarence, Mo.**

Clarence; a metallic line built to Shelbina, Mo., and other points; and several carloads of cedar poles will be placed on the rural lines.

The proposed improvements will require about two years' time to carry out, and when completed the plant will be entirely modern in all respects.

Clarence is situated on the main line between Kansas City and Quincy, and is in the midst of a very rich farming country, so that its rural telephone lines should be a paying investment.

The accompanying view shows the type of construction used in the new exchange building.

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The Old Kentucky Telephone & Telegraph Company, of Winchester, Ky., will rebuild its exchange at Mt. Sterling during the coming year. About 25,000 feet of cable will be strung and a magneto multiple switchboard equipped with 750 lines, and having an ultimate capacity of 2,200 lines, will be installed.

A new franchise was recently granted the company, permitting it to increase its rates from $1.00 to $1.50 in residences, and from $2.00 to $2.50 in business places, when 700 telephones are secured. The company now has 615 telephones in service and anticipates no trouble in obtaining the additional subscribers. The company last month raised its rates at Winchester, and Secretary J. W. Chambers reports that practically no business was lost. Another instance showing that people are glad to pay for good service when they get it!

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From Hodgenville, Ky., come reports of a very flourishing company, the La Rue County Telephone Company. This company operates two exchanges, one in Hodgenville and one in Buffalo, Ky., and both are growing rapidly. Since January 1, 1909, 85 new subscribers have been added to its list, and it is found necessary to rebuild and enlarge the Buffalo exchange this spring, in order to take care of the fast increasing business. In Hodgenville preparations are being made by Manager A. M. Lee to string considerable cable.

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The Streator Independent Telephone Company, of Streator, Ill., is experiencing a normal growth this year, and will make such extensions and new installations as are required to care for its business.

Mr. A. B. Conklin, treasurer of the company, reports installation of 15 to 25 telephones per month, net, which involves an expenditure of $450 per month for extensions.

No reconstruction is to be done this year.

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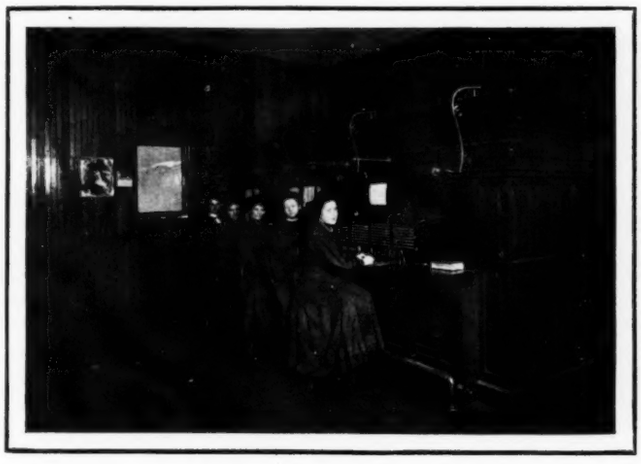
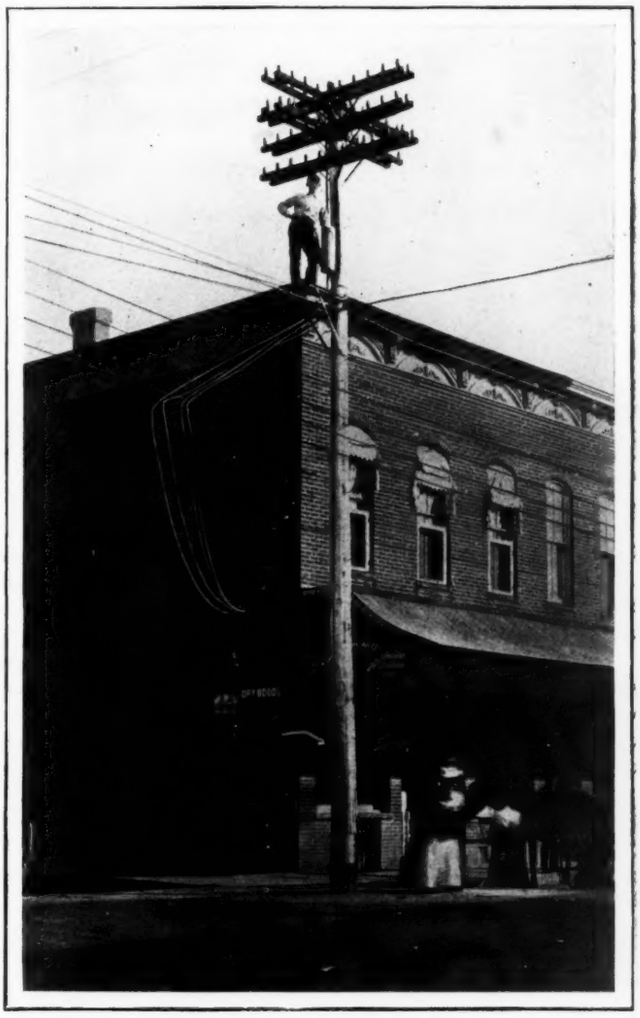
The Princeton Telephone Company, of Princeton, Ind., will probably construct a new toll circuit to Owensville, a distance of about 12 miles. Several new rural lines are now being put up and the company is installing new telephones every day. Manager F. R. Parrett reports that money for extensions is very easily obtained.



**Operating Room of the Princeton Telephone Company, Princeton, Ind.**

Telephone companies in the vicinity of Clinton., Ill., says President B. F. Wasson, of the National Telephone & Electric Company, will do a great deal of work in rebuilding old lines and constructing lines connecting their exchanges, also increasing the capacity of the trunk lines now in use. New telephones are being installed daily and it is estimated that $100,000 will be spent in the Dewitt and adjoining counties. The Macon County Telephone Company is putting in new exchange equipment.



**Office Pole of the Pierceton, Indiana, Telephone Company, from a Photograph Furnished by J. F. Zehner.**

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The National Telephone & Electric Company is just moving into its new quarters in Clinton, and now occupies three floors of the new Masonic Building.

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While the state of Ohio is fairly well developed by Independent telephone companies and has more Independent telephones than any other state in the union, still there will be considerable new construction during the coming season, says TELEPHONY'S correspondent at Columbus. In many cases there will be new exchanges built and farmers' lines added to the present exchanges. Some long distance lines will be built, especially in the northern part of the state. On the whole, while the new construction may not be as large as in previous seasons, there will be considerable money spent in that direction.

The largest amount of money will probably be spent in and around Dayton, where John H. Ainsworth, formerly connected with the Central Union Telephone Company at

Columbus, is general manager. Mr. Ainsworth, who is a practical telephone man, will supervise the expenditure of about $150,000. There will be about five branch exchanges erected. The system used by the Home Telephone Company at that place is automatic and the exchanges will be similar to several of the exchanges recently erected by the

**Distribution Pole in a Congested Residence District in Johnstown, Pa.**

Citizens' Telephone Company, of Columbus. The exchanges will be without attendance and will be erected after the latest improved plans. They will be designed to take care of 4,000 telephones.

The board of directors of the Home Telephone Company some time ago authorized the expenditure of $150,000 in new work, which will be raised by the sale of new stock. The capital stock of the company is now $2,000,000. The Home company and other corporations in Montgomery county

**Independent and Bell Circle Tops, Distribution in a Semi-Business and Residence District, Johnstown. Shows Relative Strengths of Companies.**

will extend a number of the farmers' lines this summer. The Bell company has no development in Brookville, Trotwood, Philipsburg, Salem, Englewood, Liberty and New Lebanon.

Arrangements are also being made to erect new exchanges at Osborn and Vandalia. Franchises have been secured in both villages and the work of construction will be started soon.

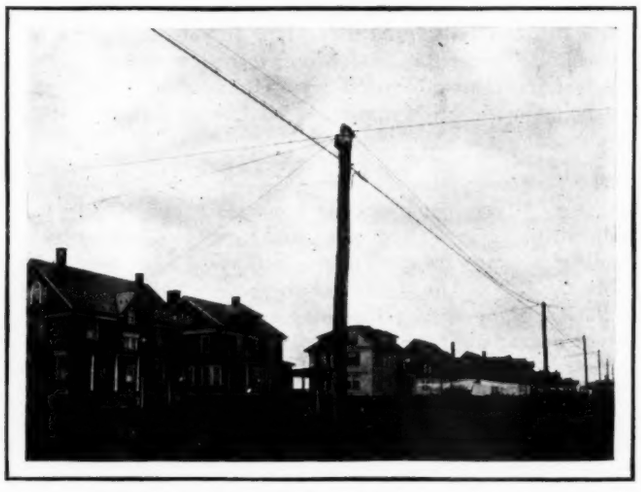
T. J. Smith, of New Lexington, will soon start the construction of five new exchanges in Perry county. The corporation which he represents is the Citizens' Independent Telephone Company and he is general manager. Mr. Smith has secured franchises in Corning, Somerset and Shawnee. The plant at Corning will have 400 telephones, that at Somerset, 500, and the one at Shawnee, 500. The work of developing the county will be carried on with great vigor.

S. S. Outcalt, general manager of the Clinton Telephone Company, which covers Clinton county, reports some new construction for the year. A number of extensions will be made to the farmers' lines and between $3,000 and $4,000 will be expended in that way. The territory in Clinton county is pretty well developed, which accounts for the small construction items. The switchboard at Wilmington, which is the largest exchange in the county, will be modified to last for several years more, when entire new construction will be made.

Some work will be done in southwestern Ohio. At Ripley, in Clermont county, a new exchange will be erected and the farmers' lines in that territory will be extended.

In Lawrence county new cables will be erected to take care of the rapidly increasing number of telephones.

Considerable new construction work will be done by the Columbus Citizens' Telephone Company, of Columbus. Just



**Multiple Cable Distribution in a Johnstown, Pa., Residence District.**

what form the work will take has not yet been decided by the board of directors. The large branch exchange in the Indianola district, which was erected last fall, has proven a great success during the winter and it is probable that the west side will be provided with a like exchange. The Citizens' company now has about 12,000 telephones in Columbus, and the development is going on rapidly.

Reports show that the Lancaster and Newark companies will do some construction work this season, although plans have not been completed for the work.

Considerable long distance work will be done in the northern part of the state.

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The Johnstown Telephone Company, of Johnstown, Pa., is constantly making additions and changes and extensions to its switchboards and cable plant. The character of the work done by this company is indicated by the accompanying photographs, which TELEPHONY is enabled to reproduce through the courtesy of General Manager E. D. Schade. A well known engineer who saw them in TELEPHONY's office at once grew enthusiastic, and said they represented the

best distribution work that had ever come to his attention. In addition to the distribution shown in the illustrations, underground cable is run direct into all the larger office buildings, stores and apartment house, thus doing away with the unsightly poles.

So far this year, 149 subscribers have been added to its list. It is expected that the company will be able to maintain this rate of increase during the year, adding about 700 stations. About 80 per cent of the wires are underground and the plant is modern in every respect. Last month the Board of Directors authorized the issuing of 2,000 shares of stock, at par value of $50 each, to shareholders, in proportion to their holdings. The stock sells in the open market for $70 a share, and this is one of the companies which, as a result of a sound financial policy and good operating, has always been able to secure new capital promptly to take care of its extensions.

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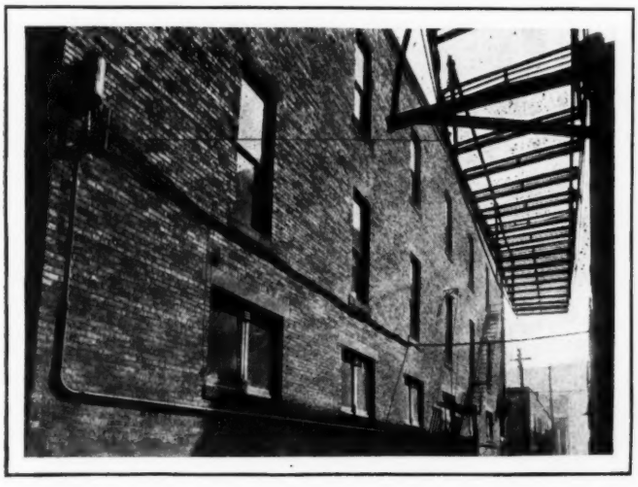
The Kibbie Telephone Company, of South Haven, Mich., will devote its construction forces this year to building rural lines, as there are numerous small, isolated districts calling for service. From the reports received by the company from the rural districts, it is judged that a considerable number of telephones will be wanted this year, although the busy season does not begin until the numerous resorts along the lake open up. Secretary J. H. Tripp reports that "there seems to be more money for investment in the telephone business at present than for many months previous. We have had no trouble in getting all we need, and more is offered." The company is owned by local stockholders.



**View of 25-Pair Block Distribution in a Business Section of Johnstown, Pa.**

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The Sedalia Home Telephone Company, of Sedalia, Mo., which was formerly known as the Queen City Telephone Company, has been re-financed and reorganized. The capital stock has been increased from $100,000 to $250,000, and an entire new equipment of the duplex relay common battery type, with an ultimate capacity of 3,000 lines, installed.

With superior equipment, home influences and no increase of its rates, the company is making a strong bid for the business, and at the present time is installing from 60 to 70 stations per month.

The officers are: W. A. Latimer, president; W. H. Clover, vice-president; F. S. Leach, secretary and manager.

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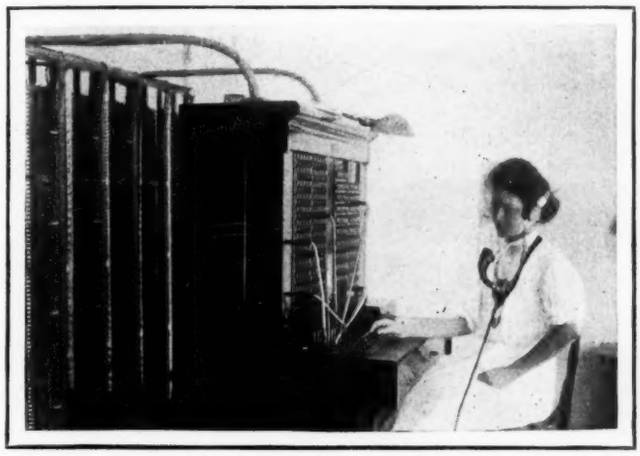
The De Land Telephone Company, of De Land, Fla., has extensions well under way. An all-cable system has been installed and a mile of aerial cable is now being strung. President M. G. Rowe reports a large increase in telephones during the past busy season, which the tourist traffic brings in the months from September to February. Last fall there were a few less than 200 stations—now the company has 246—a creditable showing for a town of about 2,500 inhabitants. President Rowe is further showing his progressive spirit by putting in an all-cable system. De Land ought to be proud of its telephone service!



**The 240-Line Board and Distributing Frame of the De Land Telephone Company, De Land, Florida.**

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The Daytona Telephone System, of Daytona, a town of about 3,000 population and a good field for development, is contemplating the reconstruction of its plant this summer.

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The Home Telephone & Telegraph Company, of Santa Barbara, Cal., has recently purchased two carloads of cable which will be used in increasing the capacity of its plant in Santa Barbara, Santa Maria and Lompoc. A new switchboard with a capacity of 800 lines has just been installed in Santa Maria and another one in Lompoc, with a capacity of 200 lines ,and one of 200 lines in Carpenteria.

The company has been installing new telephones at the average rate of 125 per month.

The competition in this vicinity is very sharp, as the Bell company cut its rate in half last August, and has had solicitors out, endeavoring to regain the subscribers which were lost when the Independent company entered the field. At the present time the Bell company has about 1,000 subscribers, while the Independent company has 2,800.

**Exchange Building of the De Land Telephone Company, De Land, Fla., Showing 300-Pr. Cable Entering Through Iron Pipe, and 150-Pr. Cable Leads North and South.**

The new toll line which will be built between San Francisco and Los Angeles, General Manager A. E. Madison, says will greatly strengthen the Independent telephone com-

View of the Lines of the King and Beshears Telephone Company, Dighton, Kansas.

panies in the territory through which it passes, as well as open up the undeveloped country in northern California.

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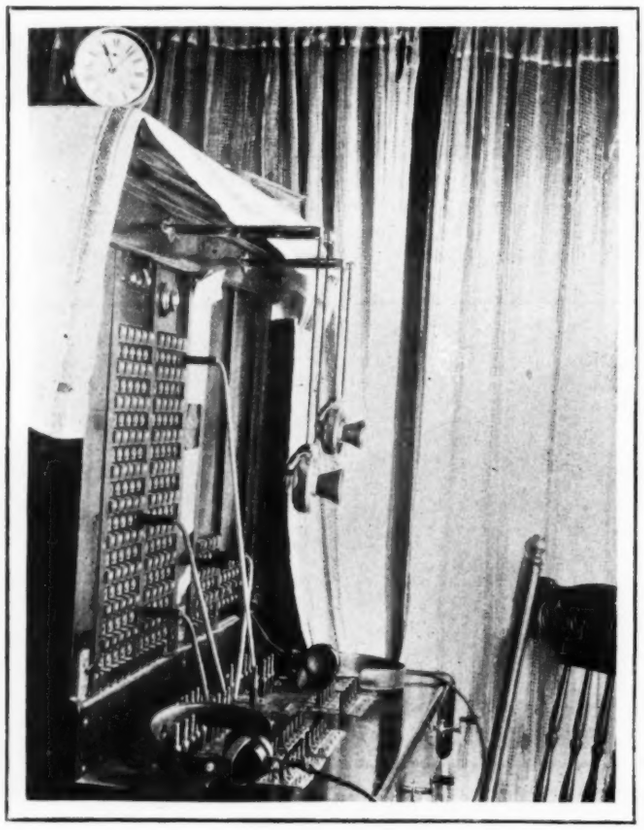
From Dighton, Kans., the King & Beshears Telephone & Light Company reports that it is in the best of condition. Several new lines will be built in the spring, which, when completed, will cover the territory thoroughly. The switchboard and construction are practically new, and the best of service is given, although there is no competition in



Switchboard of the King and Beshears Telephone Company.

that vicinity. The accompanying illustrations, furnished by Mr. B. W. Beshears, give an idea of the construction of this company's system.

Reports from Missouri indicate that very satsifactory conditions prevail.

The different companies composing what is known as the Gary group, on account of the active participation of Mr. Theodore Gary, of Macon, Mo., in their development, will continue the rapid advance which has been characteristic of these systems under their present leadership.

The Home Telephone Company, of St. Joseph, Mo., is entering into a thorough reconstruction of its plant, and when completed will take care of an ultimate capacity of 10,000 telephones. Its conduit system will cover over eight miles of trench and about two hundred thousand feet of duct. The company will build three fire-proof buildings, the main exchange to be three stories. The entire system will be cable, so far as possible, no open wires being used. The plans include building of rural and short-haul toll lines The estimated cost is $1,050,000.

The Atchison Telephone Company, Atchison, Kan., will

One of the Poles of the King and Beshears Telephone Company After a Sleet Storm.

build a number of toll and rural lines this season, and put up ten to fifteen thousand feet of cable.

The Home Telephone Company, of Joplin, Mo., will expend between $35,000 and $40,000 in extending its cable plant and rural lines, and will build additional toll lines and add circuits to its present long distance leads.

The Home Telephone Company, of Webb City, Mo., will build a new fire-proof exchange, and install a new board, power plant and cross connecting rack; also a lot of new cable and will extend its toll lines at an expense of about $25,000.

The Topeka Independent Telephone Company, of Topeka, Kan., will build a three-story warehouse this season, at an estimated cost of $9,000. It will extend its toll line in either direction and improve its plant otherwise, to the extent of between $50,000 and $60,000. Last year the exchange of the Home Company was rebuilt, and ample capacity provided in the central office. This is now one of the leading properties in which Mr. Gary is interested. The general manager of this company is Mr. W. P. Hemphill, recently

elected president of the Kansas Independent Telephone Association.

For a small system the Des Plaines Telephone Company, of Des Plaines, Ill., is a very flourishing one, having increased its system by about 65 telephones during 1908, to 440 all told. It is anticipated that about 100 will be added this year.

The company expects to install about 10,000 feet of 25-pair cable and the same length of 50-pair cable, and several miles of pole line, open wire construction. The probable cost of the work, Secretary Eley estimates, will be $5,000 to $6,000.

Mr. Frank Zinnel, president of the Carroll County Independent Telephone Company, of Savanna, Ill., reports a great deal of construction for this spring. It is going to put up about 30,000 feet of cable and string about 75 miles of copper toll line, besides doing other new work in the different exchanges which it operates in that section. The prospects for new business are very good. It is anticipated that a new telephone office will be put up in Savanna.

One of the successful Independent telephone companies of Iowa is the Plymouth County Telephone Company, of

**Operating Room of the Plymouth County Telephone Company, of Le Mars, Iowa, Showing the Local and Toll Boards.**

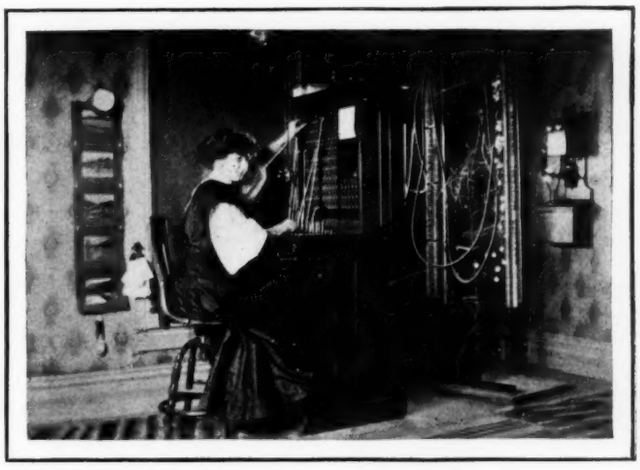
Le Mars, Iowa. This company is capitalized for $100,000, with $60,000 paid up, and its preferred stock is guaranteed to pay 8 per cent. No stock is for sale, being closely held as a good investment. The company has 1,277 subscribers, of which 714 are in Le Mars and the remaining 563 in the rural district.

The equipment of the company consists of a 6-position switchboard for the local business, and a 2-position board for the toll business. Three carloads of telephone poles have recently been purchased, which Manager O. L. Loudenslager says will be used during the coming season in extending the rural lines.

The Peoples Telephone Company, of Chillicothe, Mo., says C. L. Waite, its secretary and manager, is rebuilding its entire plant, making it a multiple common battery system, with outside construction of cable. A building is likewise in construction, and about 2,000 feet of underground will be put in at a cost of about $40,000.

In the far southwest the telephone business is booming. The Flagstaff Mutual Telephone Company, of Flagstaff, Ariz., has just completed installing a complete cable system throughout the downtown district of the city, and is planning on installing about 3,000 feet more in a few weeks.

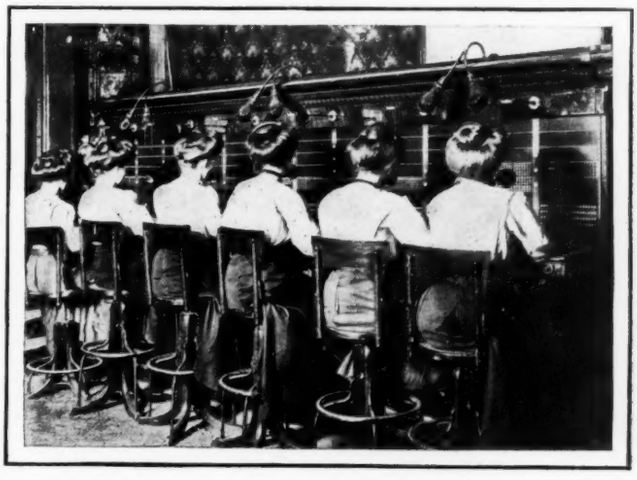
It is planning to make connection with Prescott, Jerome, Roosevelt and Phoenix, and on to Camp Verde over the government line, and from there over the lines of the Central Arizona Telephone Company, which are now in process



**Newly Connected Switchboard of the Flagstaff Mutual Telephone Company, Flagstaff, Arizona.**

of construction. They have not yet got to the point of holding regular conventions in Arizona, but Manager C. H. McKinney keeps in close touch with telephone progress, and uses the "Shield" on his stationery and elsewhere.

The North State Telephone Company, of High Point, N. C., has completed the installation of a complete central office equipment. A new 6-position central energy multiple switchboard equipped with 750 lines and having an ultimate capacity of 3,000 lines, has been installed. The company operates lines in Guilford, Randolph, Davidson and Forsyth counties, and has copper toll circuits to Winston-Salem, Thomasville, Lexington, Randleman, Greensboro and Asheboro, in addition to having toll connections with a number of smaller towns. These lines connect with Independent exchanges in all of the places except Winston-Salem and Greensboro. In these cities the North State company has



**The Six-Position Central Energy Switchboard of the North State Telephone Company, High Point, N. C.**

a franchise and it is already operating a number of Independent toll stations.

The company has paid 10 per cent dividends every year since its organization and at present has a surplus of $15,000. Mr. J. F. Hayden is manager.

Telephone conditions in North Texas, says Mr. C. A. Shock, of Sherman, have never been so favorable as at the present time. The most important construction work that is now in progress is the building of the new exchange in the city of Dallas, which has long been regarded as the key

**Mr. C. A. Shock, General Manager, Grayson County Telephone Company, Sherman, Texas.**

to Independent telephone conditions in North Texas. Plans have been completed to construct a toll line between Sherman and Dallas, a distance of about 64 miles; likewise between Sherman and Greenville.

The Grayson County Telephone Company (of which Mr. Shock is manager) is now installing about two miles of cable in Denison, which will enable it to take care of several hundred new subscribers; and it will likewise install additional cable in Sherman, where a number of subscribers are without telephones and are impatiently waiting for new service.

At Pilot Point, Texas, the North Texas Telephone Company has had a most remarkable development. It opened its exchange on January 1, 1908, with 85 subscribers and now has on its list 390, while at the time the Independents opened its exchange the opposition company had 160 subscribers and at the present time has none. The Independents own their long distance lines in this section.

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The Roswell Telephone & Manufacturing Company, of Roswell, New Mex., is contemplating installing an entire cable plant costing in the neighborhood of $10,000. Aerial cable will be used and about ten miles of toll lines will also be constructed. A new exchange building will be built, which will cost in the neighborhood of $7,000. At the present time the company has 700 subscribers, and after the contemplated improvements, expects to increase this number to 900. Mr. G. T. McQuillen is superintendent of this company.

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The Allen County Telephone Company, of Scottsville, Ky., anticipates the installation of some new switchboards, and the reconstruction of its entire system to make it more up-to-date, and to simplify the handling of its business.

The company is in a very satisfactory financial condition. General Manager W. F. Pardue reports that it paid for 1908 a 6 per cent dividend, after charging 15 per cent for depreciation.

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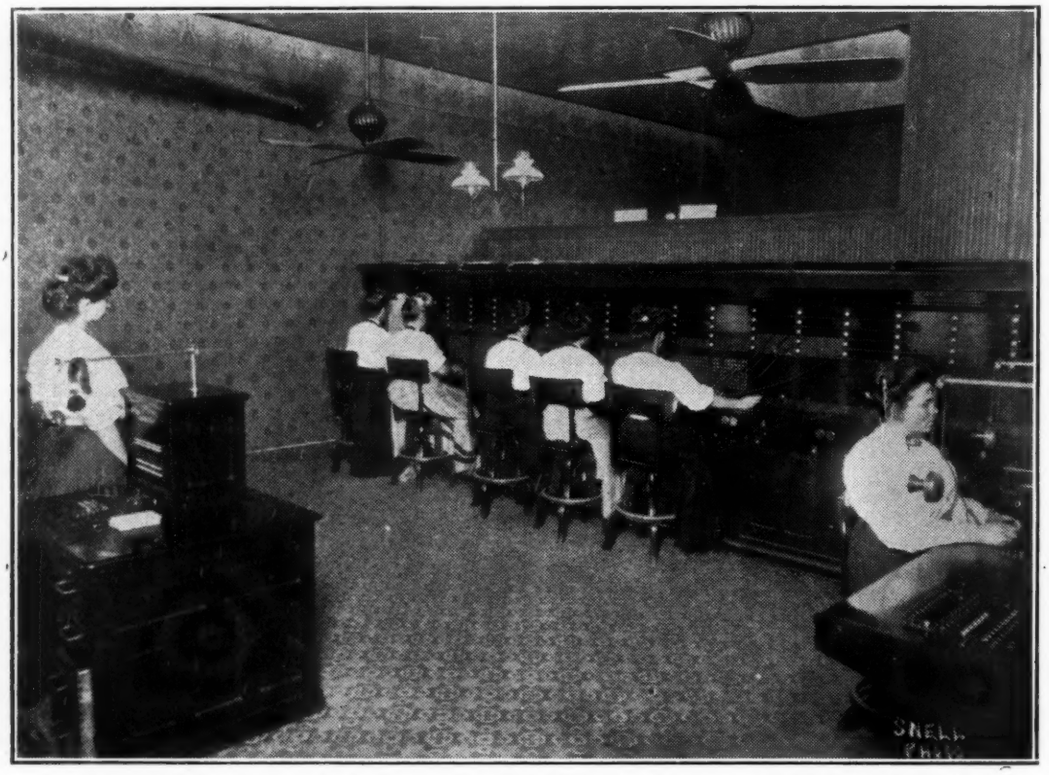
The MacDougall Telephone Company, of MacDougall, N. Y., is in a very thriving condition. This company, of which Addison Baldridge is president, operates exchanges in numerous towns around MacDougall, and owns toll lines



**Operating Room of the Sherman, Texas, Exchange, Grayson County Telephone Company.**

connecting with the exchanges at Geneva, Waterloo, Seneca Falls, Lodi, Interlaken and Trumansburg. A phantom circuit has just been cut in between MacDougall and Ovid. This spring it will construct a toll line from MacDougall to Ovid, and also about seven miles of rural lines.

The Rock County Telephone Company, of Janesville, Wis., has had no trouble whatever in obtaining all the capital needed for extensions, for the simple reason that it has paid a dividend every year it has been in operation, and for that reason its own stockholders are always glad to get new stock at par. For the past five years the stock of this company has sold quickly at $125 for all $100 shares. The company's statement for six months, ending December 31, 1908, shows the good financial condition of the company.

**Receipts and Disbursements July 1, 1908, to December 31, 1908**

Debit

| | |
|---|---|
| To cash on hand July 1, 1908 | $ 1,878.98 |
| To cash from sale of stock | 10,000.00 |
| To cash from manager for rentals | 15,021.31 |
| | $26,900.29 |

Credit

| | |
|---|---|
| Expense | $3,200.43 |
| Construction | 4,532.22 |
| Tolls | 530.89 |
| Salaries | 4,678.72 |
| Notes | 5,500.00 |
| Dividends 5% | 3,500.00 |
| Cash on hand | 4,958.03 |
| | $26,900.29 |

Resources

| | |
|---|---|
| Construction Acct. (Plant) | $93,173.32 |
| Cash | 4,958.03 |
| | $98,131.35 |

Liabilities

| | |
|---|---|
| Capital Stock paid in | $80,000.00 |
| Bills payable | 4,000.00 |
| Profit and loss acct. | 14,131.35 |
| | $98,131.35 |

The company has been in operation for nearly ten years, starting with 380 subscribers and now has almost 1900. The average annual increase of subscribers is 150 and no solicitors have ever been employed. The plant is in first-class condition, cable having been used quite extensively.

During the coming season about a mile or two of cable will be put up.

Richard Valentine, one of the leaders in Independent telephone work, is secretary of this company.

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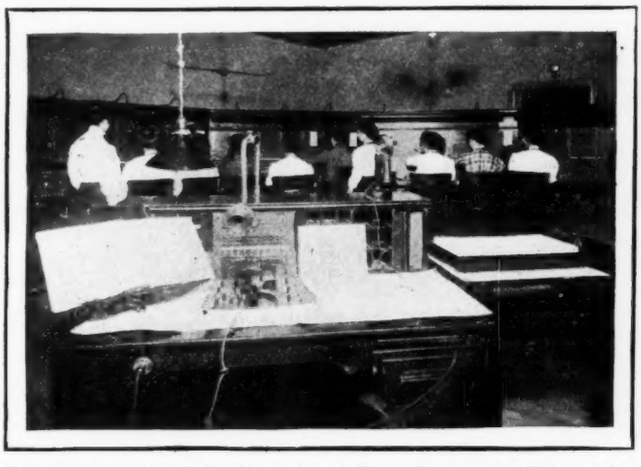
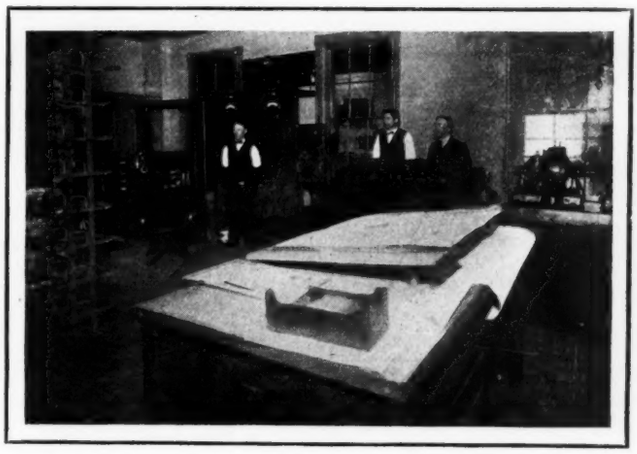
No specifications have yet been drawn up for any large additions to the plant of the La Crosse Telephone Company at La Crosse, Wis. However, additions and extensions will be made so as to take care of the normal increase in subscribers, which, for the past five years, have been on an average of about 360 per year. At the present time the company has about 2,700 telephones in service, which is several hundred more than the opposition company. This company, of which Mr. W. F. Goodrich is secretary, has always been successful in financing its extensions on a sound basis.



**The Four Section Switchboard and Chief Operator's Desk of the La Crosse Telephone Company, La Crosse, Wisconsin.**

The construction work to be undertaken this year by the Independent telephone companies of Michigan will depend a great deal upon the telephone legislation resulting from the present session of the legislature. Until the session is over, and it is seen how the telephone business has been affected by the new laws, particularly whether some of the adverse legislation now proposed is passed, the companies as a rule will confine their new construction work to that which is absolutely required by the natural grow of the service.



**Power and Terminal Room of the La Crosse Telephone Company.**

For instance, W. O. Hunt, manager of the Adrian Telephone Company, declares that Lenawee county is in need of a new exchange at Adrian, and that under normal conditions, if the present bills before the legislature had not been introduced, his company would have spent at least $100,000 this spring for a new exchange and new equipment; that the money is all ready, the plans for the building drawn, and the workman practically engaged, but it has been decided to continue to make the best of the old exchange until matters are cleared up a little.

Considerable work is being done and more will be done later in the year by the Home Telephone Company and the Interstate Long Distance Telephone Company of Detroit. The Home Telephone company plans simply to keep on adding to its present fine equipment as the demands of service, which are constantly increasing, call for it. As to the Interstate company, Mr. S. E. Fisher, states that his company is planning to spend a large amount of money this year in extending its toll lines and building new exchanges where needed.

The Citizens' Telephone Company of Muskegon is planning to build a new exchange in the near future.

The Citizens' Telephone Company, of Grand Rapids, has been gradually adopting the plan of putting in sub-stations in the city of Grand Rapids, and it is planning to build at least one more small exchange in the city this year. Its entire new plant and automatic system has just lately been completed in Lansing.

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The Greenfield Home Telephone Company, of Greenfield, Ohio ,report that the Independent telephone situation in its vicinity is very encouraging. At the present time a new magneto multiple switchboard is being installed and also a new two position toll board. With these improvements, it is expected that the company will be able to take care of all new business which will develop.

There has been a steady increase in the list of subscribers since the first of the year, and the prospects are that it will keep up during the remainder of the year.

All of the cables in the central part of the city are under

ground and Secretary Stanley Pike reports that it is possible that some aerial cable will have to be strung during the year.

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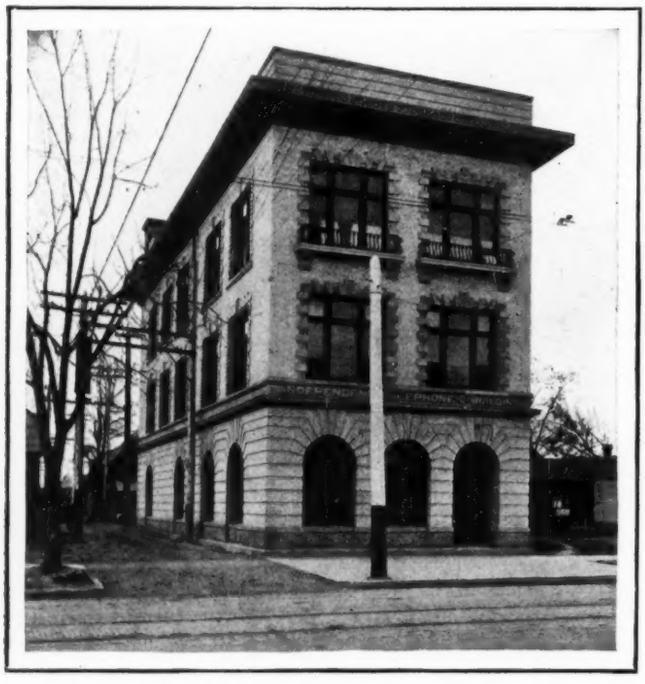
The Independent telephone situation in Idaho is very good and indications are that 1909 will be the best in the

**Operating Room of the Independent Long Distance Telephone Company, at Boise, Idaho.**

life of the state. Idaho is being very thickly settled and people are demanding telephone service.

The Independent Long Distance Telephone Company, of Boise, Idaho, reports an excellent growth, having about 3,000 subscribers on the Boise exchange, and at the present rate of growth will be doubled in three years. It also operates about 57 smaller exchanges.

For this spring, General Manager C. J. Sinsel reports that construction of several toll lines to connect with points in Utah, Oregon and Washington, is contemplated, and with the co-operation of other Independent telephone compa-



**Exchange Building of the Independent Long Distance Telephone Company, Boise, Idaho.**

nies, the Independent Long Distance Telephone Company hopes to have the Northwest fully covered with Independent lines.

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The growth of the telephone industry in several Kansas towns during the past year is regarded as almost phenomenal by telephone men of that and other states. R. L. Burns, manager of the B. & B. Telephone Company, of Hutchinson, Kan., in an answer to a question as to the growth of his particular company, had this to say:

"During the past year we have established 272 new telephones in the city. Fully 25 per cent of them are for the business district of the city and in nearly every instance the orders have been made for new industries or new stores which we have not reached before."

The B. & B. Telephone Company is preparing to make extensive improvements during the coming year. It is handicapped at present, according to Mr. Burns, owing to the surplus amount of orders in comparison with their present facilities in handling trade. Plans are made for adding 500 more telephones this year and 1,000 additional ones within the next three years.

The company has ordered new additions to its switchboards, cables, telephone poles and wire, which will arrive in Hutchinson within a few weeks. Extensions will be made as soon as possible.

"The orders that we have ahead of us compel us to make

**End of the Underground and Beginning of Aerial Cable of the Citizens' Telephone Company's System, Edinburgh, Indiana.**

some kind of a move," said Mr. Burns. "The people are asking us for immediate connection. We cannot give it to them from the fact that we have not the available facilities. Our service is taxed to the utmost at present. We put in 50 new telephones a few weeks ago, but we could not afford to say anything about it, as this would increase the demand for our connections.

"We were figuring on additional telephone connection last fall, but owing to the fact that we wished to provide a better toll service first, we abandoned the project for the time. Now that we have assurance of a direct long distance connection June 1, we can announce the fact that the home service will be increased."

According to Mr. Burns, the operators at the B. & B. telephone office handle on an average of 17,000 to 20,000 calls every day on local service. The calls answered in a year average 7,300,000. Mr. Burns said that the heaviest work fell on the operators during the month of December, through the increase in business demands.

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The Montana Independent Telephone Company, with headquarters at Butte, is now working on numerous extensions and construction work. It has completed and is operating a toll line between Helena and Butte, and a common battery exchange will be in operation in Deer Lodge very soon. A long-distance line, now being built between Anaconda and Deer Lodge, will be completed about June 15. Billings, Lewistown, Deer Lodge, Livingston, Bozeman and intermediate points are being connected with Butte by lines which will be completed in May. At Helena con-

duits have been laid, and a central office is in process of construction. A large amount of construction material is on hand here. It is expected that 1,000 telephones will be in operation in Helena by August.

During the coming year the Montana Independent Telephone Company will install exchanges in Missoula and Great Falls, Mont., and will extend lines west of Missoula. Contracts have been closed with the Interstate Telephone Company, of Spokane, whereby toll lines will be extended from Missoula to connect with Spokane at Wallace, Idaho.

Construction has been commenced at Pocatello, Idaho, and eastern Idaho will be thoroughly developed during the present season. New construction in this district will provide long distance facilities between Butte and Salt Lake City.

The Montana Independent Telephone Company is operating nearly 3,500 telephones in Butte, and an increase of 1,000 telephones is anticipated for this year. In both Butte and Anaconda the Independent telephones outnumber the opposition about three to one.

About $2,000,000 is invested in Independent telephone interests in Montana, and the extensions for the coming year will cost about $400,000. Managing Director T. S. Lane, with whom are associated many of Montana's leading business men, has a past record which makes for confidence, and in his statement to TELEPHONY says that he "is inclined to think the present year will be a banner year in Montana for the Independent telephone interests."

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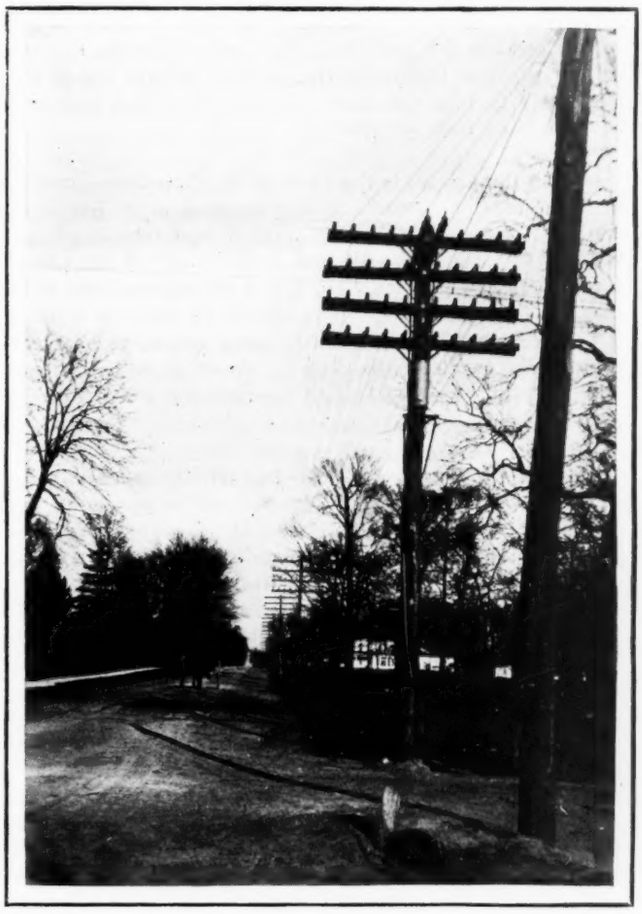
The Citizens Telephone Company, of Edinburg, Ind., was organized in 1898, starting with 50 subscribers, and at the present time has about 500. Last May a new franchise was secured for a period of 25 years and arrangements were at once made for the reconstruction of the plant. A one-story brick building was constructed and a switchboard with a capacity of 600 drops installed. Leading from

**Junction Pole, Citizens' Telephone Company, Edinburgh, Indiana.**

the exchange in four directions, underground conduits were laid within the fire district of the town. From the terminal of the underground work, an aerial cable was used to carry the wires to the limits of the town, the rural making connections to these cables. In planning the cable system, about double the needed capacity of conduits was laid, so as to provide for the future. The underground work is of very high grade, the conduits containing 250, 200, 150 and 125 pair cables, reducing outward from the exchange, and the aerial cables are gradually reduced in size at the various terminal cans, also at the extremities of the town where



**Cable Terminal on Corner Pole of Edinburgh Citizens' Telephone Company's System.**

the rural lines connect. At these points the cables have a capacity of 25 to 50 pairs of wires. About 12,500 feet of cable was used in this system and 5 cars of chestnut poles varying in sizes from 25 to 50 feet. All of the pole line hardware is galvanized and metallic circuits are used exclusively. Mr. A. T. Loughery is secretary of this company.

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The Lehigh Telephone Company, of Lehigh, Iowa, reports a steady and healthy growth ever since its organization in 1903. Over 350 telephones, over half of which are rural, are now in operation. A new 200-line switchboard was recently installed, which gives the company ample room for extension.

It is planning to install underground cable and conduit this spring. The company now has $14,000 invested. Dividends have been paid out at the rate of 2½ per cent quarterly, and the annual surplus has averaged over 3 per cent. The company has made it a practice to use the best material and high-class labor on its plant. Hal. C. Fuller is secretary and manager.

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The Morenci Telephone Company, of Morenci, Mich., reports no difficulty whatever in disposing of its stock at par, and states that it could now be sold at a premium. The town and territory in which it operates are very thoroughly covered with telephones, and for that reason, no great

amount of installation along this line is expected for this year. It recently installed a new storage battery system, and during the past year increased by about 50 telephones. This company has a banner development, operating 280 residence telephones in a village of 1,500 population. Besides this, it has 70 business and other telephones in the village, and 235 rural subscribers.

Its plant, being 11 years old, is possibly in need of some repairs, which the secretary, A. Combs, reports the company expects to look after this spring. It will install some new cable to take the place of open wires, but how much has not been fully decided upon.

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During the past year the Demopolis Telephone Company, of Demopolis, Ala., had a steady increase in its list of subscribers. Its system in this district was rebuilt, all open wires being replaced with cable, of which about 4,000 ft. was added. An additional section of switchboard was added, to be used especially for long distance and rural lines.

The rural lines are constantly being extended, and in the near future two metallic circuits, about 15 miles in length, will be built. Mr. V. L. Lee is secretary and manager of the company.

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The Home Telephone & Telegraph Company, of Ft. Wayne, Ind., is making many improvements to its lines, and is contemplating many more for the Spring season, a small portion of which were made necessary by damage done by the heavy sleet storms during February.

The greatest damage sustained was done to its oldest line, the toll line to Van Wert, Ohio, which it is necessary to rebuild entirely. This work calls for the erection of about 800 25-foot poles.

In Fort Wayne the entire east end of the city is being rebuilt. The work has been in progress for some time, and requires 1,500 ft. of 200-pr., 1,500 ft. 100-pr., and 3,000 ft. of 50-pr. aerial cable.

The company contemplates the rebuilding of the north end of the city and for this work will require 2,000 ft. of 200-pr., 1,000 ft. of 100-pr., and 3,000 ft. of 50-pr. aerial cable.

Considerable underground work will also be done from the office to Bloomingdale and the east end, and this will take 750 ft. of 400-pr., 2,800 ft. of 300-pr., and 1,600 ft. of 200-pr. underground cable, and also 300 ft. of six-way clay conduit and 1,200 ft. of six-way fibre conduit.

The work from La Fayette St. to the office will require 500 ft. of 400-pr. and 1,200 ft. of 300-pr. underground cable, and 425 ft. of six-way conduit.

The company just completed the installation of a $5,000 private branch exchange, with over 300 telephones, for the new Anthony Hotel. It also installed a private exchange in the manufacturing plant of the Knott-Van Arnam Company; and is just completing the rebuilding of the Sturgis, Mich., exchange, which it owns and operates.

The company now has about 40 names on the waiting list for service, and when the new directory is issued, which will be very soon, will have over 5,000 subscribers. It is one of the most progressive companies, and will keep up its good record during the coming year. Mr. W. L. Moellering, secretary of the company, is one of the leaders in Indiana telephone affairs.

The following telephone companies have been organized and incorporated in Indiana since the first of January. They are purchasing a large amount of material as a great amount of construction work is being done:

Aroma Farmers' Telephone Company, Aroma; Brandywine Central Telephone Company, Fountaintown; Como Telephone Company, Como; Central Mutual Telephone Company, Shelburn; Flatwoods Independent Telephone Company, Evansville; Farmers' Mutual Telephone Exchange Company, Crossplaines; Farmers' Independent Telephone Company, Riley; Grassy Creek Mutual Telephone Company, Lawrence; The Harmony Telephone Company, Harmony; The Johnson Fork Telephone Company, Rockdale; Kansas Telephone Company, Salem (R. F. D. No. 7); New Home Telephone Company, Celestine; Southern Farmers' Telephone Lines Nos. 3 and 4, Holland.

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President Howard S. Baker reports that the Sioux City Telephone Company, of Sioux City, Ia., is making extensive improvements, and enlarging the capacity of its equipment. The company is only three years old, but has at the present time 4,500 subscribers. The growth has been so rapid that outside capacity has been exhausted, and the company is installing an automatic exchange in Morningside, a suburban portion of the city, with 500 switches and five sub-exchanges with a total capacity of 700 lines, in different parts of the city.

It is also installing 70,000 feet of cable in various parts of the city.

It recently secured a contract for the installing of a hotel system with 225 telephones, after sharp competition with the opposition company; and it is expected that there will be at least 1,000 new telephones installed during the year.

This company will expend upwards of $60,000 in improvements in the near future.

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The United Home Telephone Company, of Phillipsburg, Ohio, is located in the rural district of Montgomery county and has five small exchanges, with about 1,200 subscribers. The company is entirely out of debt and is paying to over 100 local stockholders a dividend of 4 per cent semi-annually, in addition to setting aside a reasonable sum for depreciation of the plant.

The opposition company in this territory is not very strong, having only a few toll stations.

The company will do considerable reconstruction work this summer, part of which is rendered necessary by the damage due to the heavy sleet storms which occurred in February, and which was but temporarily repaired. General Manager S. A. Mosby reports that several carloads of poles; several thousand pounds of wire, and a large number of cross-arms, a large portion of which has been purchased, will be needed for this work, which will begin very soon. This reconstruction work will cost in the neighborhood of $3,000.

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During the past year the Home Telephone Company, of Cario, Ill., has enjoyed a very healthy and material growth. The plants at Mounds and Cairo have been rebuilt at a cost of about $60,000. The reconstruction of the Mounds City plant is now being completed. The list of subscribers in that place has been increased from 40 to about 190, and since July 1st of last year the list of subscribers in Cairo has been increased from 650 to 1,040.

The financial affairs of the company are in good shape. Secretary H. R. Aisthorpe reports that it is possible some new construction of importance will be announced within the near future.

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The Story County Independent Telephone Company, of Nevada, Iowa, has exchanges at Nevada, Roland, Maxwell and Cambridge, and toll lines reaching 20 Independent exchanges in Story and Hardin counties.

The exchange at Roland is now being reconstructed and the exchange at Maxwell will be rebuilt, partly with cable. About 20 miles of toll lines will be rebuilt this season, and at least one new circuit installed. Some new underground work will be done at Nevada.

General Manager F. M. Boardman reports that the prin-

cipal work this season will be in the standardization of construction and operating for the property formerly belonging to the five companies which have now been consolidated into one.

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The Lapeer County Telephone Company, which operates exchanges in Attica, Dryden and Metamora, Mich., has been granted a franchise to construct a telephone system in Imlay City, Mich., which will be done this spring. Mr. George Dewey, of Oxford, Mich., is the new manager of the company.

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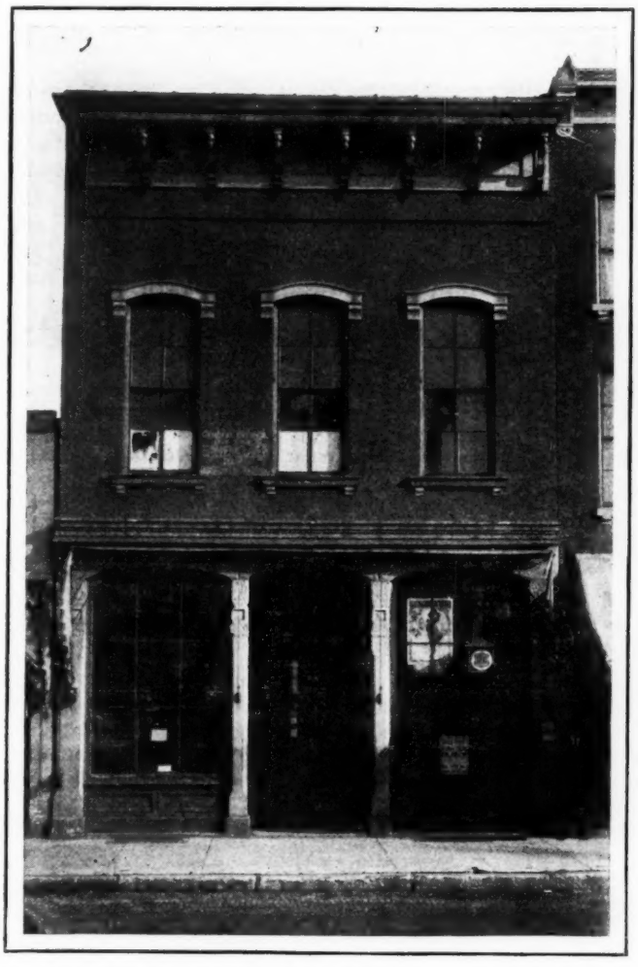
Considerable construction and building will be done during the coming year by the Citizens Telephone Company, of Pekin, Ill. A number of new rural lines will be put up, as the demand for rural service is very great. A new building has been purchased and will be remodeled for telephone purposes. About 10,000 feet of aerial cable will be strung and other improvements made. The probable cost of these



**Exchange Building of the Citizens' Telephone Company, Pekin, Ill.**

improvements will be in the neighborhood of $10,000. General Manager Geo. H. Glass is one of the old timers who has always kept well up to the front, and he will not be at all behind the leaders this year.

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The National Telephone Company of Wheeling, W. Va., reports extensive arrangements for construction this spring.

On March 1st, this company acquired the property of the Woodsfield Telephone Company, which operates in Monroe County, Ohio, and is now at work reconstructing the plant and providing the proper facilities for toll service. These will include a No. 10 copper circuit from Woodsfield to Bellaire, Ohio, one from Woodsfield to Wheeling, W. Va., and one from Woodsfield to Barnesville, Ohio, and one from Woodsfield to Sistersville, W. Va., and one from Woodsfield to Marietta, Ohio, also some toll circuits of less importance.

The Washington County exchange was opened for service March 22. About 1,000 contracts have been secured in Washington, Pa., proper as well as 1,500 subscribers operated at other exchanges in this county. Extensions in this locality will very thoroughly develope the rural districts and a new exchange will be built at Cannonsburg.

Construction and extensions will be made in Wheeling, W. Va. General Manager W. C. Handlan estimates that the expenditures for the entire territory will aggregate about $100,000, the financing of which has already been arranged.

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The mileage of telephone lines to be constructed in Western Canada during 1909 will be great, some estimates placing it at no less than 3,500 miles.

This great mileage will be constructed by Independent, rural and local companies in Manitoba, Alberta and Saskatchewan and by the local governments of those provinces.

In addition to the poles left over from last year, the Manitoba government has let contracts for an additional 50,000 for May delivery, which alone are sufficient for considerably over 1,000 miles of new line, after making substantial allowance for poles to replace those now in use. In Manitoba there are but few Independent companies—perhaps two dozen in all—but each one will apparently add considerably to its mileage of last year. During 1909 the Manitoba government will make further connections with Independent companies in North Dakota, while connections will also be made with the Saskatchewan government system, which government will also connect up with the Alberta system of government owned telephones.

In Saskatchewan the program for the year is more or less indefinite. For the past two years the Bell telephone company has been endeavoring to sell out its short mileage in that province to the government, but the negotiations are still pending. It is apparent Saskatchewan is playing a game of "freeze out" with the company, meanwhile building trunk lines in all directions and in every way helping farmers and small companies to build systems. Today there are hundreds of farmers' telephone companies in process of formation and for a year past there has hardly been an issue of the official gazette which has not recorded the incorporation of some of these baby companies, a number of which will build on the co-operative plan. Francis Dagger has charge of the telephone work in Saskatchewan and at his office in Regina several telephone experts are employed solely to furnish plans and specifications for farmers' companies and, in many cases, supplies are bought for the small organizations and charged for at the rate paid by the government. The telephone mileage to be constructed in Saskatchewan this year will be considerably greater than in either of the two other provinces, 1,500 miles being considered a low estimate.

In Alberta another progressive construction campaign will again be carried out. For two years past the government has been engaged in linking up all the principal towns in the province by building a network of trunk lines from all corners of the province.

In British Columbia, a number of the boards of trade are appealing to the provincial government to take over all the telephone lines in the province and build additional lines. In that province the British Columbia Telephone Company and Kootenay Telephones, Ltd., are the two principal companies, but there are a number of small concerns, the majority of which operate in remote districts.

# Practical Questions and Answers

### Testing Working Common Battery Lines.

**Can you suggest any way to test a working cable connected to a switchboard circuit like the enclosed sketch, without opening the jumpers? I have the necessary apparatus for making a noise and can test sleeve wires without any trouble, but the tip wires, all being grounded, I can not be sure of, as I do not get any noise.**

This subject has been quite thoroughly treated by this department and correspondence, to which we refer you to American Telephone Journal, Vol. 17, No. 12, Mar. 21, 1908, page 235; Vol. 17, No. 15, April 11, 1908, page 314. In general, we may say that your best course is to use a three-conductor test plug at the switchboard. Wire it up to a trunk line to the wire chief's desk, carrying all three wires to a three point jack like the line jack. If you wish to test the tip wire of a working pair, call central by getting across the pair. The trunk can then be plugged up, the wire chief plug in, cutting of the ground from the tip by the operator of the cut off relay, giving you a clear line through the switchboard.

### Record for Storage Battery Tests.

**What form of record do you consider good for use in putting down the readings made while testing storage battery? I want some neat, compact arrangement for ordinary tests.**

Fig. 1 shows a very good arrangement which is used where only voltage, gravity, and temperature are called for. The first column is for recording the exact time at which readings are made. Specific gravity and temperature do not change rapidly, so that if you read the voltage at the exact time set down in the first column and take the gravity and temperature immediately after, it may all be plotted as occurring at the same time. Taking the time of starting as zero, calculate the time which has elapsed since the beginning and record it in the second column. This is for use in plotting the results in the form of a curve. Nearly all voltmeters require some correction, if for nothing more

TEST OF CELL No._____ DATE _____

CURRENT HELD AT____ AMPERES.

| TIME | | VOLTS | | SPECIFIC GRAVITY | | TEMP. | REMARKS |
|---|---|---|---|---|---|---|---|
| RECORDED | ELAPSED | OBSERVED | COR. | OBSERVED | COR. | | |
| | | | | | | | |

Fig. 1.

than the fact that when at rest the pointer does not stand over the zero point. Hence the need for the "Observed" and "Corrected" voltage columns. Specific gravity is affected quite perceptibly by temperature, so that a thermometer should be placed in the electrolyte and its readings recorded in the last column. From these, the specific gravity "Observed" readings may be corrected to some standard temperature. Under "Remarks" note the performance of the battery as to gassing, color of plates, discovery of scale lodged between the plates, etc.

# Telephone Regulation and the Public Interest in Wisconsin*

An examination of conditions at leading cities in Wisconsin, as revealed by the most recent statistics in the office of the Railroad Commission, those for the year 1907 show the extremely satisfactory results of competition. The cities where there are two companies, each endeavoring to surpass the other in winning the approbation of the public, have a far greater development, and much lower rates on each system, than at non-competitive points. Prejudiced persons have repeatedly said that competition means a duplication of service facilities, and of charges. It involves these disadvantages for only a limited number of persons in these Wisconsin cities. Most of the users of one telephone on each system would, if there were but a single system, need two telephones on that system to handle the number of calls they receive and transmit. For these two telephones they would then have to pay monopolistic rates, and lose the advantages in service which are brought about by competition.

The following tables show, however, that even if all duplication which exists were wasteful, the competitive condition results in economy to telephone users, because it gives each one nearly double the number of other telephones within call through the local exchanges, at far less than double the rates. In addition, it insures prompt and reliable service, courteous treatment, and the other factors which make for pleasant relations between the public and the telephone companies as no other element can do. With competition, any weakness of employees of either system shows up in the shape of a loss of business, and thus secures prompt attention from headquarters, and the application of a remedy.

The following tables show the development, or ratio of telephones to population, in leading cities of the state:

**Table 1.—Sublicensee Development at Non-Competitive Points.**

| | Population.* | Number of Telephones.† | | Percentage of Development. |
|---|---|---|---|---|
| Sheboygan | 24,239 | 1,035 | | 4.27 |
| Wausau | 14,879 | 767 | | 5.15 |
| Kenosha | 17,061 | 1,473 | | 8.64 |
| Totals | 56,179 | 3,275 | Ave. | 5.8% |

†Includes rural and extension telephones.
*Figures from "Statesman's Year Book," 1908.

Table 1 represents the development at cities where a small, local company is the sole occupant of the field, but obtain toll service over the lines of the Wisconsin Tel. Co.

**Table 2.—Wisconsin Telephone Co. (Bell) Development at Non-Competitive Points.**

| | Population. | Number of Telephones.† | | Percentage of Development. |
|---|---|---|---|---|
| Eau Claire | 18,981 | 1,422 | | 7.12 |
| Fond du Lac | 17,719 | 1,443 | | 8.15 |
| Manitowoc* | 12,922 | 779 | | 7.03 |
| Marinette* | 15,186 | 874 | | 5.76 |
| Oshkosh* | 31,033 | 2,044 | | 6.46 |
| Totals | 95,841 | 6,562 | Ave. | 6.4% |

†Exclusive of rural and extension telephones.
*Population figures from "Statesman's Year Book," 1908.

**Table 3.—Independent Development at Competitive Points.**

| | Population.* | Number Telephones.† | | Percentage Development. |
|---|---|---|---|---|
| Appleton | 17,383 | 1,328 | | 7.7 |
| Ashland | 14,808 | 1,052 | | 7.1 |
| Green Bay | 23,688 | 1,328 | | 5.62 |
| Janesville | 13,887 | 1,236 | | 8.9 |
| La Crosse | 29,115 | 1,905 | | 6.53 |
| Madison | 25,128 | 1,826 | | 7.25 |
| Racine | 32,928 | 2,512 | | 7.61 |
| Totals | 166,937 | 11,187 | Ave. | 6.7% |

†Exclusive of extension and rural telephones.
*Figures from Statesman's Year Book, 1908.

**Table 4.—Wisconsin Telephone Co. (Bell) Development at Competitive Points.**

| | Population.* | Number of Telephones.† | Percentage of Development. |
|---|---|---|---|
| Appleton | 17,383 | 638 | 3.62 |
| Ashland | 14,808 | 582 | 3.93 |
| Green Bay | 23,688 | 2,426 | 10.25 |
| Janesville | 13,887 | 1,075 | 7.75 |
| La Crosse | 29,115 | 2,268 | 7.8 |
| Madison | 25,128 | 2,229 | 8.88 |
| Racine | 32,928 | 1,940 | 5.90 |
| Totals | 157,937 | 11,158 | Ave. 7.07% |

†Exclusive of extension and rural telephones.
*Figures from "Statesman's Year Book," 1908.

These tables, taken collectively, show an average total development of 13.77 per cent in competitive territory, as compared with an average of 6.4 per cent in cities of the same class where the Bell company is not forced to take on new business by the activity of a rival.

The effect of competition in bringing down the cost of service is shown by the following tables:

**Table Showing Average Bell (Wisconsin Telephone Co.) Rate per Telephone at the Non-Competitive Points.**

| | Monthly income from rentals | No. Tels. | Average |
|---|---|---|---|
| Manitowoc | $ 1,622.50 | 779 | $2.08 |
| Marinette | 1,830.50 | 874 | 2.09 |
| Oshkosh | 4,264.50 | 2044 | 2.08 |
| Eau Claire | 2,830.50 | 1422 | 1.99 |
| Fond du Lac | 2,888.50 | 1443 | 2.00 |
| Totals | $13,436.50 | 6562 | Av. $2.05 |

Above table excludes rural and extension telephones.

**Average Monthly Rate per Telephone for Sublicensee Companies, Non-Competitive Points.**

| | Income from rentals* | No. Tels. | Average |
|---|---|---|---|
| Sheboygan | $2,215.69 | 1035 | $2.14 |
| Wausau | 1,605.00 | 767 | 2.09 |
| Kenosha | 2,492.15 | 1473 | 1.69 |
| Totals | $6,312.84 | 3275 | Av. $1.93 |

*Includes rural and extension telephones.

**TABLE 1.**

**Competitive Points.—Average Bell (Wisconsin Tel. Co.) Rate per Telephone, Exclusive of Extension P. B. X. and Farmers' Telephone.**

| | Monthly income from rentals. | No. Instruments. | Average. |
|---|---|---|---|
| Ashland | $ 810.00 | 582 | $1.39 |
| Madison | 4,041.00 | 2,229 | 1.81 |
| La Crosse | 3,111.00 | 2,268 | 1.37 |
| Janesville | 1,342.50 | 1,075 | 1.25 |
| Racine | 2,815.00 | 1,940 | 1.45 |
| Superior† | 3,715.49 | 1,704 | 2.18 |
| Green Bay* | 3,869.56 | 2,426 | 1.59 |
| Totals | $18,892.55 | 12,224 | $1.54 |

†Sublicensee.
*Includes rural and extension telephones.

**Competitive Points—Average Monthly Independent Rate per Telephone Exclusive of Extension, P. B. X. and Farmer's Telephone**

| | Monthly income from rentals | No. Tels. | Average |
|---|---|---|---|
| Ashland | $1,408.00 | 1052 | $1.34 |
| Madison | 4,468.00 | 1826 | 2.45 |
| La Crosse | 2,869.00 | 1905 | 1.51 |
| Janesville | 1,632.00 | 1236 | 1.32 |
| Racine | 3,206.25 | 2512 | 1.27 |
| Superior | 2,529.83 | 1306 | 1.94 |
| Green Bay* | 2,182.51 | 1328 | 1.64 |
| Totals | $18,295.59 | 11,165 | Av. $1.64 |

*Includes rural and extension telephones.

Preceding tables may be summarized in the statement that at eight leading competitive points 23,389 subscribers were served for a monthly total of $37,188.14, being an average rate per telephone of $1.59. Although the average rate for Independent telephones is higher than for Bell telephones, this is solely because more of the Independent subscribers use the high-grade, one and two-party line service. The Bell subscription list carries the lower grade telephone users. For example, the lower average rate for the Bell Telephone Company at La Crosse, is, because 71 per cent of its telephones are on 8-party residence lines; the lowest grade residence service furnished by the Independents is 4-party, and 44 per cent of its subscribers use higher grade service.

At Janesville 91 per cent of Bell telephones are on 4-party business and residence lines, while 46 per cent of the Independent subscribers have elected to take higher grade service.

At Ashland 60 per cent of Bell telephones are on 8-party residence lines—lowest Independent grade 4-party.

At Superior the Douglas County Company, Bell sublicensee, reported discriminatory rates showing that business and individual line service was charged for at from $27 to $72 per year, and 260 4-party line residence telephones were free.

The preceding tables show clearly that the effect of competition is to benefit the average telephone man by lowering his rates, and giving him a wider range of communication. It enables him to reach more telephones, for less money. It is difficult to express this advantage in figures. A rough comparison between different cities may be obtained by comparing arbitrary figures determined by the following computation:

$$\frac{\text{Number of Subscribers.}}{\text{Total Population} \times \text{Average Rate.}}$$

The following tables show the number of subscribers, total population, average rate, and values of telephone service at various cities in Wisconsin, as computed by the preceding formula. As in the preceding tables, extension telephones, etc., have not been taken into account.

**Efficiency and Economy of Service at Non-competitive Points.**

| | Total number of Subscribers | Population | Average monthly rate | Computed Efficiency |
|---|---|---|---|---|
| Sheboygan* | 1035 | 24.239 | 2.14 | .02 |
| Wausau* | 767 | 14,879 | 2.09 | .02 |
| Kenosha* | 1473 | 17,061 | 1.69 | .05 |
| Manitowoc | 779 | 12,922 | 2.08 | .03 |
| Marinette | 874 | 15,186 | 2.09 | .03 |
| Oshkosh | 2044 | 31,033 | 2.08 | .03 |
| Eau Claire | 1422 | 18,981 | 1.99 | .04 |
| Fond du Lac | 1443 | 17,719 | 2.00 | .04 |

*Sublicensee companies; rural and extension telephones are included, and, on account of their lower rates, make these cities show a little better than they would if the computation were on the same basis as for other cities.

**Efficiency and Economy of Service at Competitive Points.**

| | Total Number of Subscribers, Bell and Independent. | Population. | Average Monthly Rate (Bell and Independent Combined.) | Computed Efficiency. |
|---|---|---|---|---|
| Ashland | 1,634 | 14,808 | 1.36 | .08 |
| Green Bay | 3,754 | 23,688 | 1.61 | .10 |
| Janesville | 2,311 | 13,887 | 1.29 | .13 |
| La Crosse | 4,173 | 29,115 | 1.43 | .10 |
| Madison | 4,055 | 25,128 | 2.09 | .08 |
| Racine | 4,452 | 32,928 | 1.35 | .10 |
| Superior | 3,010 | 37,643 | 2.07 | .04 |

At Madison the dpulication was less than 20 per cent of the total telephones. Assuming that this ratio holds at other places, and that all duplication represents waste, although in fact only a small proportion is wasteful, even then the average efficiency at competitive points would be more than double that at non-competitive points.

Examination of the operating expenses at competitive points show that the average for the Wisconsin company was $17.11 per telephone per year, and for the Independents, but $9.69. This at once raises the question, where did the Bell money go?

As is well known, a controlling interest in the Wisconsin company, as in all other Bell companies, is owned by the American Telephone & Telegraph Company, with headquarters in New York. Although this corporation owns long distance lines throughout the country, the greater part of its income is derived from its interest in the subordinate the subordinate properties. It does not depend exclusively on dividends on stock holdings—for some of its subordinate companies, like the Wisconsin company, are not paying dividents. The American Telegraph & Telephone Company does pay 8 per cent to its stockholders, most of whom live in New England. One of the methods of producing the

pro-rata of this 8 per cent on its enormous capital from the Wisconsin company is shown by the reports filed with the Railroad Commission to have been the exaction of "instrument rentals" for transmitters and receivers. Although first class instruments can be bought in the open market at low prices, the Wisconsin company is obliged to rent them from the company which owns a controlling stock interest. What it pays for this "privilege" is shown by the following figures, from the official reports filed with the Railroad Commission:

**Significance of Instrument Rentals as a Charge Against Bell Income.**

| | Income from Telephone Rental.* | Instrument Rental. | Taxes. | Ratio Instrument Rental to Income. | Ratio Instrument Rental to Taxes. | Total Operating Expense. | Ratio Instrument Rental to Operating Expense. |
|---|---|---|---|---|---|---|---|
| Ashland | $ 16,145.18 | $ 781.39 | $ 710.44 | 4.81% | 110.0% | $ 13,773.20 | 5.67% |
| Superior | 39,654.94 | 1,976.19 | 1,359.63 | 4.99 | 145.4 | 32,015.69 | 6.17 |
| Madison | 30,348.79 | 2,171.81 | 2,003.26 | 7.16 | 108.6 | 48,377.97 | 4.49 |
| La Crosse | 35,447.43 | 1,839.89 | 1,699.30 | 5.18 | 108.2 | 36,082.11 | 5.11 |
| Janesville | 16,195.54 | 976.75 | 877.78 | 6.03 | 111.1 | 14,988.59 | 6.03 |
| Racine | 32,704.00 | 1,921.36 | 1,766.28 | 5.78 | 108.5 | 42,753.66 | 4.50 |
| Sheboygan† | 26,588.37 | 583.62 | 636.88 | 2.2 | 91.7 | 12,432.73 | 4.7 |
| Totals | $197,084.25 | $10,251.01 | $9,053.57 | Ave. 5.2% | Ave. 113.2% | $200,423.95 | Ave. 5.13% |

†Sublicensee.
*Includes all telephones.

The Wisconsin Telephone Company pays 13.2 per cent more to its holding corporation in the shape of a rental, or tax, on the bare transmitters and receivers than it pays in taxes to the State of Wisconsin on its entire property, including real estate, buildings, conduits, poles, wire, switchboards, and the telephones themselves! This is an interesting example of the workings of foreign ownership and a monopolistic policy!

## LETTERS ON PRACTICAL SUBJECTS

### Trouble from Unusual Types of Grounds on Magneto Lines.

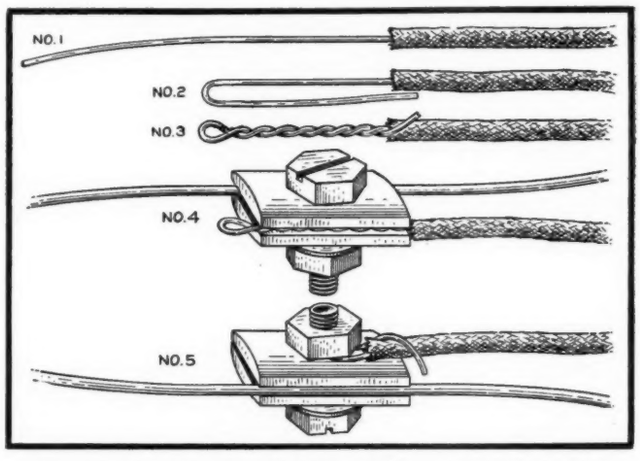
We recently had two very peculiar cases of line trouble. On one line, which carried twelve subscribers, the complaint came in that no one could ring up his nearest neighbor. In one case the distance between telephones was only about twenty to thirty rods. Neither could any be called up by "central." We could not detect any ground at any of the instruments, and all turned lightly. As a last resort we followed a piece of line wire that went through a field, and across a timber lot one-half mile. On a sharp hill about midway two poles were set one on each side of the highest point. At the crown of the hill the line wire could be reached by standing on a fence post, and here it had been pulled down and hooked on the barbs of the fence wire for about two rods. When this was let loose everything at once came O. K.

The other trouble occurred on a line five miles long, which carried eight telephones. All became grounded so the cranks could scarcely be turned at all. No one telephone could call another and central could not call the nearest telephone, which was only about thirty rods away. Any one could talk provided he could catch any other party on the line. The subscribers did not complain of the trouble for nearly two weeks. On some real warm days all could ring and talk as easily as ever. At night, when the temperature fell, no one could ring. We followed the line from town two miles into the country, to where a farmer had taken his telephone out and brought it to town, leaving the lightning arrester in the room. The subscriber had moved out in the late summer, and a renter had moved into the house soon afterward. When the telephone was installed the duplex wire was carried from the telephone out through a large crack where a log house was joined to the newly erected frame dwlling. The party moving in found that this crack let in cold winds, and filled it up tightly with clay. When this became frozen the duplex wire became a solid ground wire on the line. When it came a warm day the mud thawed and removed the pressure, so that there was no leak between the wire and ground. A few vigorous punches with a screw driver removed the clay. We drove to the next subscriber's house and could call any one clearly, the generators turning easily. These troubles were both on grounded lines, equipped with bridging telephones.

Lewiston, Mich. T. C. Mathews, Secretary,
Montmorency County Telephone Company.

### Test Connections.

There is no chance of a test clamp working loose, or the wires becoming loose, if the jumper wire is bent back on itself and then twisted spirally and inserted in the groove of the clamp and the test clamp screwed tight, and the locknut tightened. If properly applied the test clamp is better than any other joint, as it does not injure the line wire when applied or removed. It is poor policy to put more than one wire from each end in a test clamp. The accompanying




Proper and Improper Methods of Using Test Connector.

illustration shows a correct method of attaching a small wire, such as a drop wire, to a clamp, and the incorrect method of putting one wire under the locknut, which is frequently used, and causes trouble.

Chicago, Ill. L. A. Bartholomew, Jr.

### Rates and Methods of Making Collections on Rural Lines.

There has been a good deal said and written on these questions, and so, without attempting a general discussion, I will simply give my views. Sending a collector over a large territory every month is too expensive to consider. Every three months would not be so bad, provided the collector could settle all the accounts as he made the rounds, but that is an impossibility. My experience is that only about 20 per cent is collected the first trip. Then the collector has to go to the field quite often to see the man of the house. After tramping over perhaps a half mile

of plowed ground, he is told that the money is at the house, and the man hasn't time to go after it; call again. Another story is that he will have to sell something before he can pay; next time you are around he will try and have it for you. Three months from this time this same man may be away from home; call again.

Now as to rates, the telephone rates have been too low all over the country, but now there is a general raising of rates, which the farmer is not relishing. I believe, in rural districts where the rates have been $1.00 per month, if the rates were raised to $1.25 per month, and then the farmer given the privilege of paying six months in advance, at the office, for $1.00 a month, or $1.25 and having it collected every three months in advance, we should see better collections. My idea is that the company would save all its telephones, and have the money six months in advance to do business on, with no lost accounts and no collector to pay. Whenever collecting costs more than 5 per cent of the amount collected, it is too expensive for any company to stand.

Decker, Ind. J. F. Breithaupt.

### "Bell Trouble" Due to Bad Line Connection.

I had a difficult case of trouble on a rural party line reaching eight subscribers about one mile apart. The bell of the third subscriber from the end of this line would ring very faintly, though all conversations from this particular instrument were first class. We changed the ringers, tested for ground, and examined all wiring without success. Finally I examined the connection between the drop wire and the No. 12 iron. The connection was tight and clean, yet when I had it soldered the trouble was cleared. All the bells on this line were equipped with 1,000 ohm ringers.

Niagara Falls, Ont. M. O. Neil.

# Telephone News

## INDEPENDENT TELEPHONE CONVENTIONS

**Missouri, Kansas City, May 19, 20; West Virginia, Parkersburg, May 27, 28**

### Michigan Legislature Hits Telephone Business.

The telephone situation, so far as it is being affected by legislative action in Michigan, underwent some quick changes before the legislature took its weekly adjournment last week. The telephone men, who have been on the ground continuously when the various bills were before the committee, directed most of their energies at first to the bill substituting ad valorem taxation for a specific tax of three per cent, as at present, and left the Baker bill, which they thought so obnoxious that it would die by its own hand, to itself. As it turned out, however, the house committee reported out a substitute bill for the ad valorem bill, providing for a continuation of the specific tax, increased to four per cent. This was a victory for the telephone interests. But the farmers' club of the house, following the recommendation of the State Grange, got busy with the Baker bill and passed it by a bare majority.

This bill has many features very obnoxious to Independent telephone men. In addition to making telephone companies common carriers, it puts them under authority of the railroad commission, provides for compulsory interchange of messages between the Independent and Bell telephone companies, for both local and long distance business, besides making other provisions as to maximum rates to be charged for toll business. Not only do the telephone companies' attorneys declare that the law is unconstitutional, but the same opinion was freely expressed on the floor of the house. Nevertheless, the farmers hammered it through. There is little expectation, however, that the companies will have to be put to the expense of litigation, as the bill will probably be killed in the senate.

A humorous feature of the affair was a sort of panic of the farmers' club the next morning after the bill was passed when the real force of the provision making telephone companies common carriers, with the right of eminent domain, was brought to their attention. The farmers have always been very jealous of giving up rights of way to telephone companies, and when they saw that they had given the companies the right to condemn property, cut down trees, etc., if necessary, they were somewhat chagrined.

It is said that Representative Baker was inspired to introduce the feature requiring physical connection between the two companies because of the fact that in his county the northern part is covered by one company and the southern part by another, and that on election night he could not find out by telephone whether he was elected or not.

The Cramton bill, which it is understood emanated from the Attorney-General's office, and which provided for interchange of long distance business and for supervision by the railroad commission, was withdrawn for modification. What changes will be made is not known, although it has been hinted that it is to take the telephone feature out of the bill, making it apply only to telegraph companies.

The Attorney-General, who was also the author of the ad valorem tax bill, was very much put out at the failure of the general tax committee of the house to report out favorably his ad valorem bill, and appeared before them with Representative Fouch, who introduced the bill, and used some strong language. The chairman of the house committee, however, has indicated more than once that his committee at least was not disposed to favor bills simply because they were measures promised by the administration, but to report out such bills as seemed to be equitable to all concerned.

The Attorney-General argued that the assessors in different localities would fix the valuation low enough to take care of companies where special conditions would make it a hardship for them to pay an ad valorem tax. But the telephone interests replied that the law declares that property shall be assessed at its true cash value, and taking the capital stock as representing approximately the true cash value of the plant, some of the taxes of the Independent companies in the state would be increased 400 per cent.

### Important Changes in Organization of Pacific Coast Telephone Companies.

Reports from Portland, Ore., announce important changes in the controlling interests of the larger companies in the state. Stock of the Home Telephone Company, of Puget Sound, the Home Telephone Company, of Portland, and the Northwestern Long Distance Telephone & Telegraph Company has been taken over from the National Securities Company, of Los Angeles, by a syndicate of well known business men of Seattle and Portland. The syndicate is composed of Samuel Hill, Hervey Lindley, E. A. Stuart, W. G. Collins and M. A. Arnold, of Seattle, and Wm. M. Ladd, P. L. Willis, W. F. Burrell, F. H. Page and L. N.

Fleischner, of Portland. W. H. Allen, of Los Angeles, and Robert Tucker, of Toledo, Ohio, have retired from the Board of Directors of the Home Telephone Company, of Portland, and have been succeeded by Samuel Hill and Hervey Lindley.

The National Securities Company financed the construction of the three telephone companies, and its retirement is understood to place control of the property of the company entirely in the hands of local men.

It is announced that a large sum of money will be immediately available for extensions of the plant. Arrangements have already been made for the expenditure of $200,000 at Portland and a large sum for the development of Tacoma. It is said that about $500,000 more is likely to be subscribed for different purposes during the coming year.

### Home Telephone Company, of Los Angeles, Gets Rate Increase.

On March 19th the council ratified an increase in rates for the Home Telephone Company, of Los Angeles, Cal., to a scale equivalent to that of its competitor, the Pacific Telephone & Telegraph Company.

The rates per month, under the new ordinance, are as follows: Business main lines, unlimited, $5.00; two-party lines, $4.00; business, four-party lines, $3.00; residence, unlimited, $3.00; two-party lines, $2.25; four-party lines, $1.50; extensions, $1.00; private exchanges, one trunk line, $8.00; each additional trunk line, $6.00.

### Indiana Telephone Conditions Show Great Improvement.

The condition of Independent telephony in Indiana has reached an important and permanent stage of development. Notwithstanding its previous marvelous record of growth, the incidents of the past few weeks have endowed the great system with such an impregnable position as to enable it to maintain a more positive and effective competition against all monopolistic inroads than has hitherto been possible. The decision of Judge Parr in the Boone County Circuit Court, March 17, delivered the final blow to the suit against the Indianapolis Telephone Company and the New Long Distance Telephone Company in sustaining a demurrer to the amended complaint filed by the state, thus ending the efforts of Prosecutor Hooton, of Indianapolis, to annual the charters of the companies, and to place the properties in the hands of a receiver. Every ruling and decision of this celebrated case has been favorable to the telephone companies, and this fact coupled with the enactment of an ordinance by the city council of Indianapolis, enabling the Indianapolis Telephone Company, through an amended franchise, to stand on an equal footing relative to privileges with competing companies, has done much to advance and strengthen the Independent systems throughout the state.

One other thing gives promise of being one of the great achievements of the Indiana telephone men, and that is the passage of the Legislative Act permitting telephone companies organized under the laws of Indiana to consolidate or combine for economic purposes, as well as to better resist the wiles and flattering promises of the monopolistic opposition. There are now few difficulties to be overcome, and the present year promises greater accomplishments in the development and extension of Independent telephony in Indiana than for any previous period.

Among the notable improvements to be made during the year is the construction, by the Indianapolis Telephone Company, of a new and commodious exchange building, to be installed with modern equipment, including a new switchboard, and eastern exchange building and equipment at Irvington, a thickly populated suburb, the laying of conduits west of the river and strengthening the leads of the local system. The campaign of extending the long distance lines will be continued. For the faithful carrying out of these improvements the company has deposited with the city a bond for $25,000. There is much cause for congratulation over the condition in Indiana which has been brought about in spite of the efforts of the opposition's trained corps of obstructionists.

### Senator Dolliver's Bill for Telephone Regulation Holds Over Until Fall.

Our special correspondent in Washington reports that there are no new developments in the matter of Senator Dolliver's bill for the regulation of telephone companies which was referred to in TELEPHONY about three months ago. The senator will not speak on it at this session, and will let it lie over until the regular session, which begins in December.

### Ohio Telephone Men Approve Practical Discussion at Convention.

The large number of telephone men who attended the annual meeting of the Ohio Independent Telephone Association held in Columbus, O., recently were well pleased with the result of the meeting. They returned home, feeling that much interest had developed in the meeting. This is especially true of the second day's session which was given up to the discussion of practical matters connected with the operation of telephone plants. It was resolved that the convention would hereafter consist of two days and that the practical phase would be given adequate attention in the future.

The executive committee will be named by President Frank L. Beam in the near future and one of the first important duties will be the arrangements for the Cincinnati meeting, to be held in a few months. It is the intention to invite the Independent telephone companies from the adjoining states of Indian and Kentucky to participate in the meeting, which will be under the auspices of the Cincinnati district of the Ohio Association.

Alternates to the next meeting of the International Independent Telephone Association were named as follows: H. C. Devin, Mt. Vernon; H. Hildebrand, Washington C. H.; D. O'Dell, Springfield; C. C. Heller, Beaver Dam; J. G. Steinkamp, Elmore; H. N. Allen, Troy; W. H. Brown, Caldwell; E. L. Coen, Vermillion; Charles Duncan, Chillicothe; A. V. Hageman, Lorain; N. Liggett, Marysville; J. McDowell, Ironton; C. E. Nungester, Celina; W. A. Norton, Kenton; J. F. Smith, Cadiz; O. L. Spangler, Bryan; C. D. Young, Delaware; E. G. Miller, Warren; W. B. Gregson, New Philadelphia; H. Armstrong, Athens; John Collins, New Lexington; H. P. Folsom, Circleville; George Kratzer, Mt. Orab; R. W. Boyd, London, and J. A. Devore, Bryan.

### Sleet Storm Damage in Kosciusko County.

"We are indebted to J. W. Scott, general manager of the Commercial Telephone Company, of Warsaw, for the following information as to the damages to Independent telephone property in Kosciusko county by the sleet storm February 14th:

| | |
|---|---|
| Miles of wire down | 580 |
| Number of poles down | 700 |
| Cost of labor to repair lines | $1,827.00 |
| Cost of material to repair lines | 1,700.00 |
| Total cost to repair damage caused by storm | $3,527.00 |

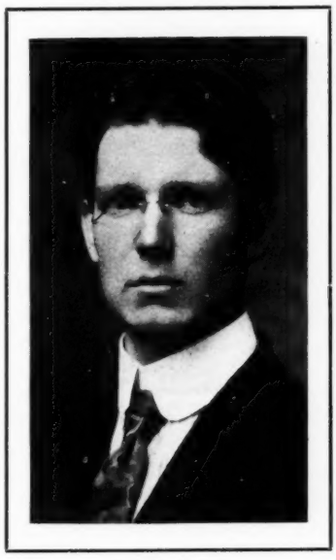
"If to this be added the loss from service, we have, at least in this one section, a loss of $4,000.00 to Independent property from the storm.

"It is advisable to keep these figures in mind when you get tempted to extend your area of free service, or take on new business at an unprofitable rate."—Bulletin of the Indiana Independent Telephone Association.

# In the Manufacturing Field

**Mr. B. Yore's New Field in Consulting Engineering.**

A new departure in consulting engineering has been made by Mr. B. Yore, of Dayton, Ohio, formerly manager for the United Telephone Company, of Bellefontaine, Ohio. He announces that he will supply diagrams of circuits suitable for use in almost all cases where for any reason it



Mr. B. Yore.

may be desirable to use other than the usual well-known circuits.

His technical education and long experience with both manual and automatic apparatus, together with his clean record, should make it unnecessary to say anything in regard to character of the work to be expected from his office. He expects to devote most of his time to the needs of the small and medium-sized exchanges which are not justified in keeping a high-priced circuit man for the few times when he could develop his full earning capacity.

Mr. Yore is also prepared to furnish operating companies their own circuit diagrams in a neat, convenient hand book, suitable for the troubleman to carry in his pocket or tool grip. For this purpose his blue printing department is provided with the latest improved machinery for turning out blue or white prints of any size in very short order.

Mr. Yore is the first electrical engineer to take up this particular line of work, and the success of his undertaking will be watched with great interest.

**Dean Company's Sales Increasing.**

A showing of eighteen switchboards during one working week of six days is the record made by one of the largest Independent manufacturers. The Dean Electric Company advises that during the week ending March 27th it shipped the following eighteen boards, which is at the rate of three a day:

Twelve private branch exchanges ranging from 50 to 200 lines each, for use on the Pacific Coast. One 200-line P. B. X. for the Kansas City Home Telephone Company; a 25-line magneto switchboard for Eureka, Ill.; a 100-line board for Everett, Pa.; a 150-line switchboard for Burlington, Kan., and a 300-line exchange for Delta, Pa.

The other job was a rush order to replace the Fair Haven, Vt., exchange, which was destroyed by fire on March 16. The new equipment was ordered the next day and was shipped from Elyria on the 24th, reached Fair Haven, Vt., the day it was promised, the 26th, and was in full operation on the 28th.

An interruption of only twelve days on a complete replacement of a common battery exchange is a record that all Independents may be proud of. The business done by the Dean company during this week is only an indication of a widespread business awakening.

THE WYCKOFF PIPE & CREOSOTING COMPANY, 50 Church Street, New York City, has just issued its new catalog E describing its numerous creosoted materials. The advantages and the saving which can be secured by the use of creosoted wood conduit is gone into at length, and the manner of laying the conduit is illustrated. The good qualities of creosoted cross arms and poles are also discussed.

THE FAIRMOUNT ELECTRIC & MANUFACTURING COMPANY, of Philadelphia, Pa., has purchased the patents of the "H. W. W." wire connector, or test clamp, and has added some slight improvements to the device. The new owners are now manufacturing these connectors, which have been extensively used throughout the country since 1902, and can make prompt shipments.

THE AMERICAN AUTOMATIC TELEPHONE COMPANY of Urbana, Ohio, is installing an entirely all cable plant for the Citizen's Telephone & Message Company at Fostoria, Ohio. The company has also just completed the installation of a plant at Urbana, Ohio, of 1,500 lines capacity, and has started the installation at Bellevue, Ohio, of a plant with an initial capacity of 1,200 lines.

THE CARBOLINEUM WOOD PRESERVING COMPANY, of Milwaukee, Wis., has issued a 24 page illustrated catalog pertaining to Avenarius Carbolineum wood preservative. Much information is given regarding methods of wood preservation. Illustrations show methods of applying the preservative, and various places in which the treated timber is used.

WM. J. MURDOCK & COMPANY, Chelsea, Mass., has issued a circular describing the Murdock circuit detector which is adapted for all purposes of testing for open circuits. The detector is a combination of a head telephone, battery and cord with test handles and can be carried in the pocket.

PAGE & HILL COMPANY, of Minneapolis, Minn., mails to its customers, every little while, folders which contain matter of interest to all users of cedar poles. Pole users would do well to have their name placed on the mailing list.

THE NAGEL-CHASE MANUFACTURING COMPANY, of Chicago, Ill., has recently added some interesting devices to its manufacturing facilities and is making arrangements for getting out some new goods which are particularly interesting to the telephone trade.

THE CHICAGO LUMBER & COAL COMPANY has moved its St. Louis office to the seventh floor of the Third National Bank Building, that city.

THE AMERICAN ELECTRIC COMPANY, 6400 State Street, Chicago, has just issued several circulars describing the uses of its adjustable bracket specialties which will be mailed to any one interested.

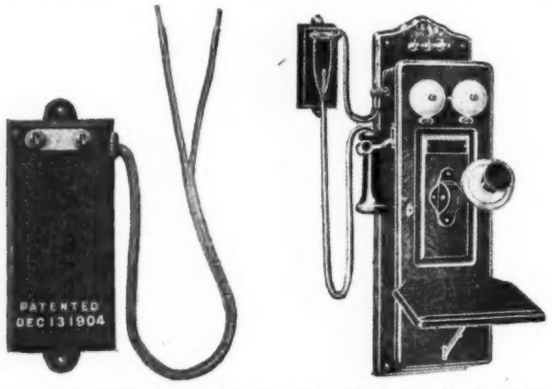
### Cresco Telephone Condensers.

The necessity of condensers in series with receivers, on party line telephones, is becoming so generally recognized that companies which have not purchased telephones so equipped are buying the condensers separately and installing them where needed.

The Electric Specialty Company, of Cresco, Iowa, is the sole manufacturer of the Cresco "Ring-thru condensers," mounted in black enameled iron cases, in a form suitable for attachment to the wall beside the telephone. These may be installed in a few moments by connecting the condenser to the telephone, and attaching tthe receiver cord to the condenser in binding posts provided for this purpose. When so connected, it makes it impossible for subscribers who take the receiver off the hook to hold up the working of the line, by preventing the ringing of other bells.

Without a condenser, the greater part of the ringing current passes through the telephone that is off the hook. The condenser, owing to its special electrical properties, will prevent the ringing current from going through the talking circuits of these telephones with receivers off, so that it all goes through the bells of the other telephones on the line. At the same time, talking current which has different electrical properties will pass through the condenser so that the instrument is just as efficient for hearing as when only the receiver is used.

These condensers, although they have always been manufactured exclusively by the Electric Specialty Company, which owns broad patents covering this style, first became known when




**The Cresco Condenser and Method of Installing Outside Telephone Set.**

they were marketed by the Julius Andrae & Sons Company, of Milwaukee, which formerly had the exclusive selling rights. They are now being, not only manufactured, but sold by the Electric Specialty Company.

The Electric Specialty Company in its circulars describing these condensers, has a page of information on "What our condensers will do" and "What our condensers will not do." This is a good practical talk which will interest operators of and subscribers on non-selective party lines.

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THE READING STANDARD COMPANY, Reading, Pa., has its new catalog of the well-known R-S line of motorcycles ready for distribution. In order to take care of the increasing demand for its product, which is being used extensively by telephone men working on rural lines, the factory is now running day and night.

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THE C. J. LITSCHER ELECTRIC COMPANY, of Grand Rapids, Mich., is one of the progressive dealers in telephone exchange supplies. The company has made a good start and its business dealings are such as to make its continued success a certainty. Mr. Litscher has a wide acquaintance, and is very popular among Michigan telephone men.

### The Nagel-Chase Ground Clamp and Connector.

The Nagel-Chase ground clamp shown in the accompanying illustration is a particularly substantial device. Ground clamps of other types are generally made of stampings and

**Sectional View of the N-C Ground Clamp.**

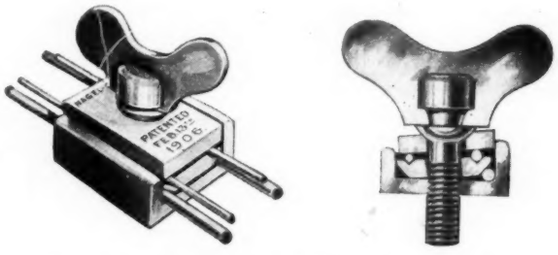
these it has been found after exposure to cold and wet weather, will in time crack and loosen.

Many other clamps are attached by perforated strips, which are subject to cracking when subjected to the conditions above mentioned.

The N-C ground clamp is made of heavy rolled brass and it is claimed will not crack or give under any conditions of heat, cold or dampness. The fastening strip is made of copper which is tinned. The hole in the body of the clamp is not drilled through, thereby preventing injury from the screw where the pipe is of lead. The clamp is a reliable device and will command approval of practical telephone men.

This company also manufactures the well known N-C test connector, which is so favorably known to telephone men. As shown in the illustration, no tool is needed in using this connector, as it is provided with a wing screw. In applying, the connector can be hooked onto the line wire while the other wires to be connected are being brought into position.

Telephone men have been looking for some time for a heavier connector for use on toll lines. To meet this demand such a connector has been devised by the Nagel-Chase Company. This connector is made on the same general lines as their regular test connector, having all its



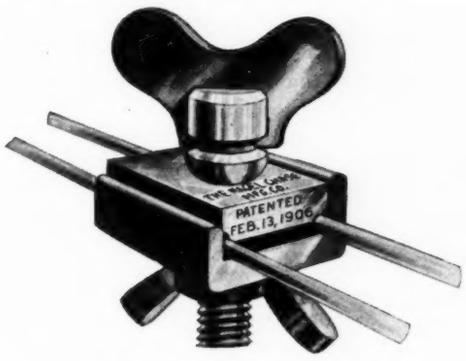

**The Test Connector and Sectional View of Same.**

good features and in addition a winged lock nut which is plainly shown in the accompanying illustration.

Among other telephone specialties which this firm manufactures is a line fuse which has been used by many of the

leading telephone companies for years and has given general satisfaction. These fuses are made with either wooden or porcelain dowels in several styles.

Theo. Nagel is president of the company which manufactures these devices and G. M. Chase, secretary and treasurer. The factory is located at 249-251 South Jefferson Street, Chicago.




The New N-C Toll Connector.

The Stromberg-Carlson Telephone Manufacturing Company, of Rochester, N. Y., has issued a new 40-page complimentary duplicate order book which will be sent to all customers upon request. It contains information to purchasers as to methods of ordering, terms, and a list of warehouses from which direct shipments can be made from stock. For convenience in ordering the code numbers of standard telephones are given.

### A Live Telephone Printing Business.

One of the companies which is making good progress, and getting its full share of the printing business of the telephone companies, is the Phonoprint Company, of Defiance, Ohio. This company, although a young one, having but recently gone into the business of printing books, blanks and forms for local and toll business, reports that since October 15th, 1908, it has shipped its goods to a great many customers in no less than 33 states in the Union; and that other shipments have gone into New Mexico and Canada.

The company owns its own printing establishment, and the officers make it a part of their policy to give direct and careful attention to all orders. Toll tickets are one of the specialties of the company, and orders in a single mail are reported to have sometimes run up to 150,000 to 200,000 tickets. The company states that recently one week's shipments amounted to a million tickets.

Regular forms are all standard, but if something special is desired, the company will if something special, is dethe matter up and give prompt sired, the company will take attention to all communications. The accompanying illustration shows one of the forms which the company is printing in large numbers. Its line of standard forms is used a great deal, and gives a great many valuable suggestions to the manager who cares to investigate.

No. .....

To Grant County Telephone Co. Dr.

Instrument Rental and Telephone Exchange Service for month of .....
Toll and Messenger Service for .....
Balance Due .....
Total

Date Paid ..... 190....

..... Collector.

No. .....

To **Grant County Telephone Co.** Dr.

To Rental of Instrument and Telephone Exchange Service for Month of ..... 190..
To Toll and Messenger Service for Month of ..... 190.. (See Rates on back of this Receipt.)
To Balance Due .....
Total.

*Received Payment* ..... 190.. BY ..... COLLECTOR

One of the Bill Forms Printed by the Phonoprint Company of Defiance, Ohio.

### The Peirce Hammer Drill.

In installation work, labor furnishes so large a portion of the items of expense that practical men are always on the lookout for time-saving devices. Drilling a brick wall is a recognized existing necessity, which almost every telephone company operating in a fairly well developed business or apartment house district, has to deal with.

Of the devices which help workmen to get through with a large amount of work in a short time, and to handle it easily, is the Peirce hammer drill, which has been in practical use in many exchanges and is meeting approval of all members of the construction department.

The Peirce Hammer Drill in Use.

The method of using it is made clear by the accompanying illustration.

The Enochs Electric Company, of St. Paul, Minn., has issued two circulars describing respectively, "A Direct Current Receiver," the well-known invention by Mr. C. D. Enochs, and "Changing a Magneto System to Common Battery," which operation is said to be easily and economically performed by the method set forth in the circular.

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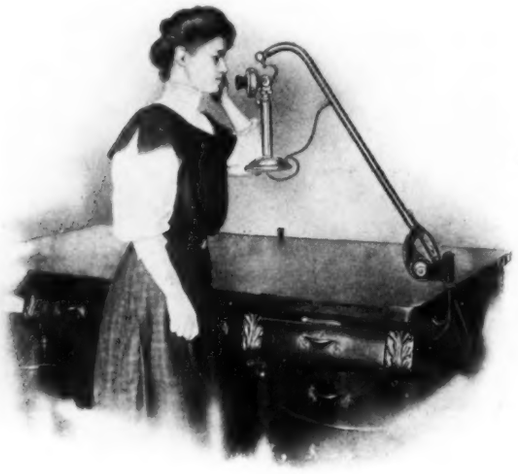
The W. H. McIntyre Company, of Auburn, Ind., manufactures a highway motor vehicle, or a special trouble wagon, which is being extensively used by telephone companies. These wagons are money makers because they enable men to cover more territory and get around promptly, thus cutting off rebates for telephones out of service, and

keeping the subscribers contented. An item in the Auburn *Courier,* contains an interview with Manager Van Fleit, of the Central Union Telephone Company, in which he reports 33 new rural telephones installed and 11 changes made by a force of two men, using a McIntyre trouble

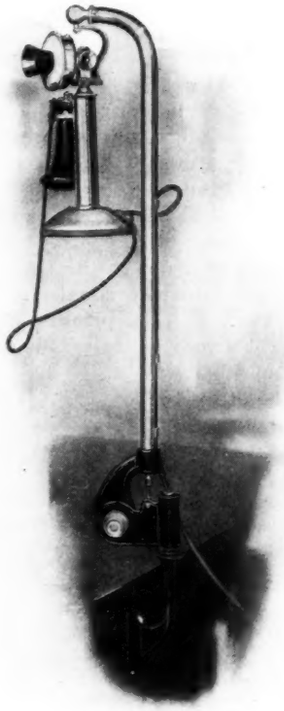


Using a Telephone Supported by a Radio Holder.

wagon, while at previous times, the services of three men have been required to do the same work, taking ordinary methods of transportation.

### A New Desk Telephone Holder.

A new telephone arm or holder has just been placed on the market and will undoubtedly find much favor among users of desk telephones. As shown in the illustrations this telephone holder is up and off the desk and out of the way when not in use. Normally it holds the telephone in a ver-



The Radio Telephone Holder in Use and in Normal Position When Not in Use.

tical position, but by an ingenious device can be moved in such a position to suit the user's convenience.

It is also very convenient for use on a flat top desk as the telephone may be used by two or four persons without forcing them to leave their seats.

The arm permits the telephone to be used while standing as well as sitting and while holding the telephone perfectly secure, it does not hold it rigidly.

It is known as the Radio telephone holder and is manufactured by the Swedish American Telephone Company, of Chicago.

### The Guy Anchor Question.

I have been reading Mr. A. E. Patterson's article concerning tests on three different makes of anchors; also Mr. Frost's comments on same. Mr. Frost goes right after the milk in the cocoanut when he says Mr. Patterson does not compare prices. The price is one of the main things to be considered about an anchor.

In a test of four leading anchors made in Baltimore, Md., it was shown that an anchor of 60 sq. ins. would stand just twice as much strain as one of 30 sq. ins. These anchors were set in sand and clay soils; and all parties agreed in writing that the test was fair to all. Every pull on each anchor was recorded on a dynamometer, no guess work about it. The test showed that an anchor set 7 ft. deep would stand twice as much strain as one set 4½ ft. deep.

After a two days' trial the Miller anchor was adopted and a sale of 3,650 made. We are now grinding up our auger blades good and sharp ready for another trial.

G. H. Miller.

Dean Electric Company, Elyria, Ohio, announces that Park Litten has joined its sales force, and will be a traveling representative in the territories served by the Kansas City branch house.

Mr. Litten comes to the Dean Electric Company after 14 years of successful experience with the Central District & Printing Telegraph Company, where he became familiar with the work of the various departments. He is a thoroughly competent telephone man, capable of advising customers on all operating problems.

Previous to joining the Dean Electric Company's staff, he was connected with the Pittsburg branch house of the Western Electric Company, where he made a creditable record as a salesman.

# Condensed News Reports

**Officers of companies are earnestly requested to forward us promptly all financial and other statements as soon as issued and any items of interest as to their plants and systems**

## NEW COMPANIES.

EUREKA SPRINGS, ARK.—The Greenwood & Winona Party Telephone Company was organized recently with the following officers: President, James Hull; secretary-treasurer-business manager, George Russ.

SAN LUIS OBISPO, CAL.—The Adelaide Rural Telephone Company has been incorporated at San Luis Obispo, by Otto Wyss, A. A. Dubois, W. I. Davis and others.

BOSTWICK, GA.—Articles of incorporation have been asked for by John Bostwick, A. O. Nunnally, James M. Preston, C. F. Riden, G. H. Wagnon, C. A. Lewis, F. H. Bostwick, J. M. Almand and G. W. Porter, to build and operate a telephone system to be known as the Bostwick Telephone Company, with a capital stock of $2,500

FRUITLAND, IDAHO.—The Farmers' Mutual Telephone Company, limited, has filed articles of incorporation, with a capital stock of $10,000. The directors are: B. F. Tussing, A. Grimes, L. H. Rich, H. R. Flack and C. H. Sargent.

CELESTINE, IND.—Articles of incorporation have been granted the New Home Telephone Company, of Dubois county, to build and operate a telephone exchange and lines in Celestine and Dubois counties. The directors are: B. Nordhoff, George W. Jacobs, L. L. Jacobs. The capital stock of the new company is $500.

BLAIRSBURG, IA.—The Cedar View Telephone Company has been organized with the following officers: G. W. Coleman, president; P. C. Stone, treasurer; H. L. Doty, secretary. Directors: T. Dinsdale, A. P. Miller, Antone Singer, A. Thomas, J. R. Cheyne, J. W. Thompson and S. C. Thompson. Material for the line has been ordered.

BIGELOW, KAN.—At a recent meeting, the Bigelow Mutual Telephone Company was made a permanent organization with the following board of directors: W. Tilley, J. L. Wilkin, T. A. McCandless, J. T. Dawkins, Chas. Jones, A. J. Dunham, I. M. Owen, Edgar Williams and O. N. Griffs. The officers are: W. Tilley, president; Charles Jones, vice-president; J. L. Wilkin, secretary, and T. A. McCandless, treasurer.

GLASGOW, KY.—The Rocky Hill & Beckton Telephone Company has been organized here by W. G. Harris and others with a capital stock of $500. Construction will soon be begun on a local Independent telephone line from Glasgow to Beckton, via Rocky Hill. W. G. Harris, of Glasgow, is manager.

SOUTH PARIS, ME.—The Citizens' Telephone Company with a capital stock of $5,000 has been organized by the following: Alton C. Wheeler, W. J. Wheeler, O. K. Clifford, T. F. Thibodeau, A. E. Shurtleff, W. F. Caldwell, Charles Edwards, W. H. Sweet, George H. Davis, J. F. Plummer, Eben N. Marshall, A. B. Talbot, F. A. Shurtleff, Walter L. Gray, F. R. Witham, Albert L. Holmes, all of South Paris. The officers are: President, Walter L. Gray; treasurer, Charles W. Bowker. It is intended to operate lines in Hebron, Oxford, Paris, Norway, Sumner and Buckfield.

GALESBURG, MICH.—With W. S. Lawrence as chairman and Sidney Morton, secretary, the Citizens' Home Telephone Company has been organized to install a system in this place.

AITKIN, MINN.—The Aitkin Telephone Company has filed articles of incorporation. The incorporators are: Herman Moork, F. M. Shook of Aitkin and C. P. De Laittre and J. L. De Laittre of Minneapolis. The capital stock is $24,000.

CEDAR BLUFF, MO.—A new telephone company has been organized by the farmers of this place with J. J. McConnel as president.

HUSON, MONT.—Articles of incorporation have been filed by the Huson Creek Telephone Company with a capital of $5,000. Lines will be conducted between Cottonwood Creek and the east fork of the Snowy Mountains in Fergus county.

CORTLAND, NEB.—Articles of incorporation have been filed by the Highland Telephone Company of this place. The incorporators are: M. M. Stanley, C. E. Stewart, T. W. Sargent, all prominent farmers of Highland township. The company will do business in Gage and Lancaster counties. The capital stock is $21,000 and the officers are: President, M. M. Stanley; vice-president, Thomas Sargent; secretary, T. W. Sargent; treasurer, J. P. Clough.

ALTON, N. H.—The Home Telephone & Telegraph Company has filed articles of incorporation with a capital stock of $5,000.

TRENTON, N. J.—The South Jersey Rural Telegraph & Telephone Company of Landis township has been incorporated with a capital stock of $25,000. The incorporators are: Frank Macomber, A. H. Wilson and Cuno Becker.

STANLEY, N. M.—The Stanley Telephone Company was organized recently with a capital stock of $6,000. The following are the officers: J. H. Darnell, president, general manager and treasurer; J. O. Leatherwood, vice-president; W. C. Scoval, secretary. Directors: E. Y. Park, W. F. Castle, W. T. Williams, H. C. Kinsell and Henry Williams. The company will build about 60 miles of line to obtain connection with Santa Fe.

WHALLONSBURGH, N. Y.—With a capital stock of $2,000, the Essex & Whallonsburgh Telephone Company has been incorporated by C. W. Sherman, P. N. Stafford, W. O. Fisher and others of this place.

LEXINGTON, N. C.—A company has been organized by C. F. Koontz, G. M. Thompson, Baxter Leonard and others to construct a telephone line from Lexington to Tyra and probably to Spencer.

JEROME, N. D.—D. M. Glasgow and others have filed articles of incorporation for the Southwest Telephone Company.

MARYSVILLE, OHIO.—The Farmers' Telephone Company of Union County has been organized with the following officers: President, J. D. Coe; vice-president, C. W. Vanhiney; secretary, W. N. Plotner; treasurer, W. N. Thomas. Exchanges will be installed at Raymond, Byhalia, York, East Liberty and West Mansfield. The directors are: J. W. Moore, Harrison Longberry, W. W. Warwick, H. T. Inskeep, A. L. Coons, Nate L. Moffitt and W. B. Jolliff.

KANSAS, OKLA.—The Delaware Central Telephone Company, recently chartered with a capital of $500, has the following organizers: D. A. Smith, W. J. Holbrooks and others.

GREENTOWN, PA.—The Cresco & Greentown Telephone Company has been organized with a capital stock of $5,000. The treasurer is Stewart Shively and the directors are: Stewart Shively, Myron A. Price, Foster B. Mikels, Chas. W. Seese, Lafayette Price, all of Canadensis, Pa.

JACKSON, TENN.—Messrs. William Arnold, J. F. Ward, Edward Hart, Z. T. Johnson and John Steadman have filed a charter to incorporate the Farmers' Telephone Company. The company is capitalized at $1,000 and a system will be operated in Madison and Chester counties.

CORNHILL, TEX.—With a capital stock of $30,000, the Cornhill and Gravis Telephone Company has been incorporated. T. A. Grumblers, V. A. Harville, B. A. Condra, J. A. Buchanan and W. G. Harrison are the incorporators.

ISLE LA MOTTE, VT.—The Isle La Motte Telephone Company has filed articles of incorporation with the secretary of state at Montpelier to build telephone lines in Grand Isle, South and North Hero, Isle La Motte and Alburg. The capital stock is $5,000.

RETREAT, WIS.—A new telephone company has been organized by people living south of here and the Bates line has been purchased. The officers of the new company are: President, A. A. James; vice-president, C. A. Battles; secretary, J. A. Brudos; treasurer, Albert Olson. Directors: Andrew Olson, Robt. Mellem, E. Morton.

## CONSTRUCTION.

SHORTER, ALA.—The Shorter Telephone Company is constructing lines to Waugh, Montgomery county, and Ware, Elmore county.

FLORENCE, ARIZ.—The Consolidated Telephone-Telegraph Company will extend its line from Florence to Kelvin and Ray within a short time.

PHOENIX, ARIZ.—A telephone line will be built from Phoenix to the McDowell Indian Reservation by the Indian and Forest services, probably connecting with the Reclamation Service line at Granite Reef. The line will extend to the Forest Service range station on Sycamore Creek, about six miles east of the fort.

BAKERSFIELD, ARK.—The Bakersfield Southern Telephone Company has reconstructed its line and ordered a new switchboard which is to be installed in the local exchange.

CARTHAGE, ARK.—The directors of the Grant & Dallas County Telephone Company are planning to build telephone lines to Poyen, Prattsville, Tull, Ivy, Brush Creek and Lono as soon as possible.

CARTHAGE, ARK.—The Grant & Dallas County Telephone Company has decided to push its line to Poyen, Prattsville, Tull, Ivy, Brush Creek and Lono as rapidly as possible.

DOGWOOD, ARK.—The Dogwood Telephone Company has extended its line to Walker.

MOUNTAIN VIEW, ARK.—A telephone line connecting with the Farmers' line is being constructed from Mountain View through the Rochwoods territory.

MORRILTON, ARK.—A new switchboard will be installed and

other improvements made at a cost of about $1,300 by E. J. Massey, manager of the Home Telephone Company of this place.

POINT PETER, ARK.—A telephone line will be built from Settlement to St. Joe, Searcy county, by John R. Hensley, for the Settlement Telephone Company.

SALADO, ARK.—J. A. Kaneaster has completed a telephone line from this place to Batesville.

LOS ANGELES, CAL.—The Home Telephone & Telegraph Company will install much new equipment. The lines to South Pasadena will be completed within a few weeks.

MECCA, CAL.—The Coachella Valley Telephone & Telegraph Company will increase its system from ten to fifteen per cent this Spring, by the building of new lines.

SACRAMENTO, CAL.—The extension of the Forest Service telephone line from Van Metre's to old Minersville has been completed. The material for extending the line from Burnt Ranch to Hawkins Bar has been received and the work will begin at once.

AKRON, COL.—The North Side Telephone Company is constructing a line connecting Otis with Burdette and furnishing service to a number of intervening ranchers. It will probably extend the line into Akron.

HAMILTON, GA.—The Hamilton Telephone Company has purchased a new switchboard which will be installed at once.

TRENTON, GA.—Farmers living in the vicinity of Sand Mountain have decided to build a telephone line running from Overlook, Ala., to Trenton, Ga. The material for the line has been ordered, and it is expected that it will be in operation within a short time.

TRENTON, GA.—The Sand Mountain farmers have built a telephone line from Overlook, Ala., to Trenton, Ga.

VIDALIA, GA.—The Normantown Telephone Company is building a telephone line from Normantown to Vidalia.

BOISE, IDAHO.—The Filer Farmers' and Business Men's Mutual Telephone Company, which was recently chartered, has ordered a switchboard and line material and will start construction work at once.

CANTON, ILL.—The Canton Home Telephone Company will build a No. 10 copper line this spring from Canton to Macomb.

DECATUR, ILL.—At a recent meeting of the directors of the Home Telephone Company, it was decided to install a 500 line addition to the switchboard. This additional equipment is needed to take care of the increased growth of the company's service.

ELLIOTT, ILL.—The Dix Telephone Company is contemplating erecting an exchange building at an estimated cost of $2,000.

FORRESTON, ILL.—The Farmers' Mutual Telephone Company intends to build ten miles of new line at German Valley and also in the vicinity of Forreston.

PHELPS, ILL.—The Berwick Farmers' Telephone Company is planning for the extension of its lines in this vicinity.

MOUND CITY, ILL.—The Home Telephone Company is installing an all cable and copper system at this place.

ELKHART, IND.—Plans have been made by the board of directors of the Home Telephone Company for the erection of an exchange and office building. The company also contemplates overhauling its system and extending its lines.

EVANSVILLE, IND.—The Blue Grass Telephone Company has secured a franchise and will build telephone lines through Vanderburg into Warrick county. The company also purposes to build exchanges in the towns and villages through which the lines run. John Tilze is president of the company.

INDIANAPOLIS, IND.—The directors of the Indianapolis Telephone Company have decided to build and equip a new branch exchange building in the east part of the city, to be known as the Irvington exchange. The estimated cost is $80,000, and work is to commence at once.

LA GRANGE, IND.—The Home Telephone Company of this place has received copper wire for the line which is to be built between La Grange and Wolcotville, and work will be commenced at once.

MICHIGANTOWN, IND.—The directors of the Michigantown Co-Operative Telephone Company have decided to rebuild and extend the company's lines. The capacity of the switchboard will also be increased.

ROSEDALE, IND.—The Citizens' Mutual Telephone Company is having a new switchboard installed.

WABASH, IND.—The Home Telephone Company will rebuild its lines between Wabash and Lafontaine, replacing the iron wire with copper.

WABASH, IND.—It is proposed to build a telephone line from New Haven, Ill., to the Wabash river, where cable connections will carry it across and connection will then be made with the lines of the Home Telephone Company of this city.

ALTON, IA.—At the annual meeting of the Case Telephone Company held recently at Newkirk, it was decided to install a new switchboard in the Newkirk exchange.

CEDAR RAPIDS, IA.—The Cedar Rapids & Marion Telephone Company will make many improvements in its exchanges at Marion, Mt. Vernon and Kenwood Park. About $15,000 will be spent in the development of the lines and exchanges in Marion and $5,200 for similar improvements in Mt. Vernon. A cable will be strung between Cedar Rapids and Kenwood Park. The proposed improvements will require in the neighborhood of about 60,000 ft. of cable, as an all cable system will be installed in Mt. Vernon.

CORNING, IA.—The Corning Telephone Company is planning to make many improvements to its system this spring. The plant will be rebuilt and about 20,000 feet of cable used, of which 2,200 feet will be placed underground. Quotations for the material to be used will be desired about May 1.

MARNE, IA.—The Marne and Elk Horn Telephone Company has purchased a lot in this place and intends to erect a cement exchange building.

SAC CITY, IA.—It is reported that the Elwood Independent Telephone Company will reconstruct the local system, lay seven blocks of underground conduit and install about 3,000 feet of underground cable. Considerable aerial cable will be strung and the pole lines in the city and adjacent country will be thoroughly overhauled. A new switchboard will also be installed.

SIOUX CITY, IA.—The New State Telephone Company has completed the construction of three new copper toll lines to Omaha, Neb., and has also opened direct toll connections with Homer, Winnebago, Walthill, Rosille, Lyons and Oakland, Neb. The latter places have not heretofore had connection with the New State company's lines.

WHAT CHEER, IA.—Mr. J. T. Snouffer, manager of the What Cheer Telephone Company, is contemplating the installation of a new switchboard.

ASHLER, KAN.—The Rural Telephone Company is planning to improve its line.

BLUE RAPIDS, KAN.—The Bigelow Mutual Telephone Company will make a number of extensions and improvements to take care of its increasing business.

CLYDE, KAN.—The Clyde Telephone Company has installed a new switchboard in the local exchange.

HUTCHINSON, KAN.—R. L. Burns, manager of the B. & B. Telephone and Telegraph Company, has announced that material and equipment has been ordered to take care of an increase of 500 subscribers.

INMAN, KAN.—The Inman Mutual Telephone Company has ordered a new and larger switchboard for its exchange in this place

JUNCTION CITY, KAN.—O. E. Hutchins, local manager of the Wareham-Dewey Telephone Company, is preparing plans for a new two-story building to be used for the exchange. A common battery multiple board with a capacity for 1600 lines will be installed when the building is completed.

MINERAL, KAN.—The Mineral Telephne Company will remodel its exchange building and make other improvements.

QUINTER, KAN.—The Quinter Telephone Company has decided to install a thirty-line switchboard at Collyer and make other improvements. A larger switchboard will be placed in the Quinter exchange.

ROZEL, KAN.—W. D. Middlekauf will install a new 100 drop switchboard in the local exchange. This is necessary on account of the fact that the rural telephone lines coming into this place have been consolidated.

SALINA, KAN.—The Salina Telephone Company will rebuild the line between Salina and Gypsum this spring.

SMITH CENTER, KAN.—At a recent meeting of the Reamsville Farmers' Telephone Association it was decided to build a toll line between this place and Reamsville, starting construction at once.

WESTMORELAND, KAN.—The Westmoreland Telephone Company has purchased the telephone system at Olsburg, Garrison and Stockdale. A line will be built to Olsburg and a switchboard installed at that place.

WOODRUFF, KAN.—The Farmers' and Merchants' Telephone Company of Alma has purchased a lot here and will immediately erect a brick exchange building upon it. The work of installing the company's system is progressing rapidly and it is expected that the switchboard will be connected within a short time.

HALL, KY.—The recently organized Lower Beaver Creek Telephone Company will build a local line from Hall via Puncheon, Saltlick and Jones' Fork to Lackey, a distance of 20 miles, where connection will be made with the Big Sandy Long Distance Telephone and Telegraph Company. Richard Hall of this place is manager of the company.

HALL, KY.—The Upper Rockhouse & Beaver Creek Telephone Company will install a new switchboard at Colson and make improvements to its line. A connection will be made at Baker with the lines of the Eastern Kentucky Home Telephone Company. Dr. T. A. Cook, of this place, is manager of the company.

HAZARD, KY.—The Perry County Telephone Company announces that it will build lines to Dwarf and to Nappier, distances of ten and twelve miles. A new switchboard will be installed in the local exchange. Considerable material will be needed for this work. The manager of the company is D. Y. Combs of this place.

SERGENT, KY.—It is reported that the Letcher County Home Telephone Company will shortly begin the construction of a local line from Sergent via Mayking, Beulty, Pound Gap and Pound, Va., to Glamorgan, Va., a distance of 24 miles. The construction will be begun as soon as the necessary material can be secured by W. B. Webb of Sergent, who is manager of the company.

WHITESBURG, KY.—The Whitesburg Telephone Company will make a number of improvements, among which is the installation of a new switchboard in the local exchange. A new line will be built from Whitesburg to Dongolia, a distance of four miles. L. Wilson Fields is the new manager of the company, succeeding S. H. Fields, who recently resigned.

WILMORE, KY.—The Jessamine Home Telephone Company will rebuild its system in this place. The open wires in town will be replaced by cable and the lines will be extended into the country. B. Y. Chambers is the local manager.

BREAUX BRIDGE, LA.—The Breaux Bridge-St. Martin Telephone Company will build lines and make connection with several desirable parts of St. Martin Parish. A number of farmers' lines will also be constructed.

MARQUETTE, MICH.—The Marquette County Telephone Company will build several new lines this Spring. The exchange at Austin will be moved to Gwinn and the recently built line to Chocolay will be extended to Skandia.

STURGIS, MICH.—The Home Telephone Company has just completed many improvements to its plant. Among them being a new switchboard and the stringing of several hundred feet of cable. A line about five miles long will be built into the rural districts within a short time.

BIRD ISLAND, MINN.—The Osceola Farmers' Telephone Company is planning to extend its line to Melville.

BLOOMING PRAIRIE, MINN.—The Corning Farmers' Telephone Company, which was recently organized, will soon begin the construction of its line.

BRECKENRIDGE, MINN.—The Brushvale Farmers' Telephone Company will construct a line from this city to Kent.

BROWN VALLEY, MINN.—A local exchange will be established by the Tri-State Telephone Company in this place.

CANBY, MINN.—The Farmers' Mutual Telephone Company, of Gary, S. D., has been granted a franchise to enter this city.

CHASKA, MINN.—The Norwood-Young America Telephone Company expects to construct a line from Waconia to this place.

CHISAGO CITY, MINN.—At a meeting of the citizens of this village the Farmers' & Village Telephone Company was organized. C. E. Swenson was elected president; George Noren, secretary, and C. W. Dixon, treasurer. The company will construct twenty miles of line and install a switchboard as soon as possible.

CLEARWATER, MINN.—The Clearwater Telephone Company is contemplating the extension of its lines. G. P. Boutell has been elected president.

DETROIT, MINN.—Arrangements have been made by Detroit Telephone Company for the construction of a farmers rural telephone line to McHugh. An exchange will also be installed at Fergus.

ELMORE, MINN.—The Rome & Elmore Telephone Company at a recent meeting decided to rebuild the entire line. The Rome & Marna line will also be rebuilt.

EVELETH, MINN.—The Missabe Telephone Company has constructed a new circuit to Gilbert in order to take care of the increasing business.

FOSSTON, MINN.—The Garden Valley Telephone Company will extend its line to this city.

FRAZEE, MINN.—The Turner & McNairy Telephone Company recently purchased the local telephone exchange.

GARDEN VALLEY, MINN.—Several new lines will be constructed this Spring by the Garden Valley Telephone Company.

GRACEVILLE, MINN.—It is expected that the Parnell Co-operative Telephone Company will extend its lines and make other improvements in the near future.

LONG PRAIRIE, MINN.—George Lano and others are arranging for the construction of a telephone line which will be eleven miles in length.

MURDOCK, MINN.—The Murdock-De Graff Telephone Company is contemplating installing a new switchboard.

MURDOCK, MINN.—A telephone line from Murdock to Dublin will be constructed by the Murdock-Kerkhoven Telephone Company.

NORTHFIELD, MINN.—The Tri-State Telephone Company will install a system in this place.

PERLEY, MINN.—The Perley Telephone Company will extend its line to Felton.

RICHWOOD, MINN.—The Detroit Telephone Company will construct a line to Callaway.

ST. PETER, MINN.—The Traverse & Lake Prairie Telephone Company will extend its line into Lake Prairie township.

ST. VINCENT, MINN.—A number of extensions will be made to the lines of the Northern Telephone Company.

THIEF RIVER FALLS, MINN.—The directors of the Red Lake-Marshall Counties Farmers' Telephone Company recently decided to construct and rebuild several lines.

MERIDIAN, MISS.—The Mississippi Home Telephone Company, operating at Hattiesburg, Vicksburg and Meridian, has secured a right of way from the Gulf and Ship Island Railroad to build a long distance telephone line along the railroad from Hattiesburg to Gulfport.

COLUMBIA, MO.—The Columbia Telephone Company has ordered a common battery multiple switchboard having a capacity of about 5,000 lines. The system will be entirely rebuilt and practically an entire all-cable plant installed.

ELDON, MO.—The Eldon Telephone Companny has constructed a new line to Olean, and also one to Barnett.

HOLDEN, MO.—The Holden & Pittsville Telephone Company has decided to rebuild its line, using cedar poles.

LIBERAL, MO.—The Liberal & Hannon Telephone Company will build a new line from this place to Curless Corner. This will give the company two local lines besides the commercial one.

MEXICO, MO.—The Buffum Telephone Company is installing new equipment in the local exchange.

MILO, MO.—The Milo Telephone Company will install a new switchboard in the local exchange and make many other improve-telephone connections.

CULBERTSON, MONT.—An exchange will be built in Culbertson by the Montana Star Telephone Company as soon as the weather permits.

LEWISTOWN, MONT.—The Mutual Telephone Company is preparing to construct a line to Stanford, and from thence to Great Falls.

LEWISTON, MONT.—The Lewiston-Billings Mutual Telephone Company has completed its line to Windham, and is preparing to extend it to Stamford. From that place the line will be run to Geyser and Great Falls.

ROCKFORD, NEB.—The New Home Telephone Company is preparing to extend its lines in this locality.

MOAPA, NEV.—The Muddy Valley Telephone Company is constructing a line from Moapa to St. Thomas, passing through Logan, Capalopa and Overton. S. H. Wells, S. R. Whitehead and Brigham Whitemore are the promoters of the line.

SILVER CITY, N. M.—The Independent telephone line between Silver City and Mongollon has been completed and work is being pushed on the line to Cooney by Manager Roy H. Johnson.

DODGE, N. Y.—At a recent meeting of the stockholders of the Akeley and Dodge Telephone Company it was decided to extend the line to Russell.

DUNKIRK, N. Y.—The police commissioners have made a five year contract with the Dunkirk Home Telephone Company to install and maintain in this city, a police patrol telephone system having 20 or more boxes.

MALONE, N. Y.—The Adirondack Home Telephone Company has set aside $4,000 for extending and improving its lines. About 8,000 ft. of aerial cable will be used and several new lines constructed. There are 100 on the waiting list who will be supplied with telephones when the improvements are completed.

PLATTSBURG, N. Y.—The Clinton Telephone Company is installing a system in Dannemora.

PORT HENRY, N. Y.—The Port Henry Telephone Company has purchased a new switchboard, which will be installed this month. Between $4,000 and $5,000 will be spent in improvements this season.

RENSSELAER, N. Y.—The Rensselaer Home Telephone Company has funds to the amount of $30,000, available for the construction of a system in this place. From 15,000 to 20,000 ft. of aerial cable, 5,000 ft. of underground cable, 1,500 ft. of conduit and 600 poles will be used in the construction of the system.

SPRINGWATER, N. Y.—The installation of the local system of the Canadice Telephone Company is progressing rapidly.

TROY, N. Y.—The Commercial Union Telephone Company will complete the line started last year to connect with exchanges in Clinton, St. Lawrence and Franklin counties. From 600 to 700 poles will be required for this work, which will cost in the neighborhood of $15,000. The line when completed will give communication with Plattsburgh and other northern points.

LEXINGTON, N. C.—A stock company has been formed to build a telephone line from Lexington direct to Tyro. It may be extended on to Spencer. Messrs. C. F. Koonts, G. M. Thompson Baxter Leonard, W. B. Hunt, N. H. Swicegood, Dr. J. E. Cathell and others are behind the proposition.

BEACH, N. D.—A modern telephone system will be installed by the Golden Valley Telephone Company in this place.

CANDO, N. D.—It is probable that the Farmers' Telephone Company will build a line from Rock Lake to Perth, as farmers reand Shortiesville.

ELLENDALE, N. D.—Extensive improvements are being considered by the Dakota Central Telephone Company.

FLASHER, N. D.—William Simpson, W. F. Berrier and others will construct a telephone line to Mandan.

KNO, N. D.—The construction of a telephone line to Pleasant Lake and Rugby has been completed by the Farmers' Telephone Company. Connections will also be made with Minnewaukon, Mylo and Rolette.

NEW SALEM, N. D.—At the annual meeting of the stockholders of the Red Butter Independent Telephone Company, it was decided to reconstruct the line. C. W. Stevens was elected president and C. W. McCormack, secretary.

WASHBURN, N. D.—Wilcox Bros. of Hansler have organized a company which will construct a long distance telephone line in Oliver county.

WASHBURN, N. D.—It is reported that the Washburn Telephone Company will construct about 50 miles of rural lines this season.

WASHBURN, N. D.—Wilcox Bros. of Hensler have formed a telephone company and will build a long distance and farmers' telephone line along the river in Oliver county. Sanger, Center, Hensler, Deapolis and Stanton will be connected with Washburn by this line.

BELLEFONTAINE, OHIO.—The Logan County Farmers' Telephone Company will install one new exchange and construct about 30 miles of new lines this coming summer. Charles F. De Remer, of West Liberty, is manager of the company.

BUCYRUS, OHIO.—The Bucyrus Telephone Company has erected a building for its new telephone exchange in which an automatic switchboard will probably be installed.

LIMA, OHIO.—It is reported that the Lima Telephone & Telegraph Company will erect a new exchange and office building costing in the neighborhood of $50,000.

ST. MARY'S, OHIO.—The directors of the St. Mary's Telephone Company have ordered additional equipment to take care of new subscribers. One of the rural lines will be rebuilt for a distance of seven miles.

SANDY RIDGE, OHIO.—The Wayne and Goshen Telephone Company has arranged to connect with the company at Jerusalem and will also extend its line from Stumptown to Somerton.

WOODSFIELD, OHIO.—The Woodsfield Telephone Company will, it is announced by R. S. Hargrove, build a line to Marietta. Lines will also be constructed from Woodsfield to Barnesville and Clarington.

FAIRVIEW, OKLA.—The Fairview Telephone Company will install a new 200 line switchboard, including equipment for local and long distance work.

NORMAN, OKLA.—The Norman Telephone Company is rebuilding its system and will increase its switchboard capacity. The improvements will cost about $50,000.

CORVALLIS, ORE.—The Independent Telephone Company is making many improvements to its system. A new switchboard is being installed and 1,000 feet of 150 pair cable has been strung.

PILOT ROCK, ORE.—The Inter-State Telephone Company is contemplating extending its line to Long Creek, Grant county. The proposed new line will pass through Ukiah, Dale, Range, and possibly Ritter to Long Creek, a distance of about 45 miles.

COLLINS, PA.—The South Lancaster County Telephone Company has constructed a new line from this place to Puseyville and contemplates the construction of several other lines.

COLUMBIA, PA.—The Columbia Telephone Company will replace all its open wires in Columbia with cables.

MAUCH CHUNK, PA.—A new switchboard has been installed and other improvements made to the local exchange of the Consolidated Telephone Company.

MORGANTOWN, PA.—The Conestago Telephone & Telegraph Company is rebuilding its line between Goosetown and Elverson.

NAZARETH, PA.—The Slate Belt Telephone Company is constructing a new line to Newberg, Hecktown and Brodheads and it will probably be extended to Bethlehem in the near future.

NEW WILMINGTON, PA.—Since the first of January the New Wilmington Telephone Company has built about 15 miles of pole line, and obtained between 30 and 40 new subscribers.

PHILADELPHIA, PA.—The Rehrersburg & Womelsdorf Rural Telephone Company will extend its line to Bernville, Strausstown siding in Saginaw, Sarles and Hansboro are desirous of having ments to its system.

REITZ, PA.—The Central Telephone Company will build a branch line from Reitz to Crumb, in the near future. This will be very convenient for residents of that place and vicinity, as this line connects at Hooversville with Somerset.

DELMAR, S. C.—The Delmar Telephone Company has purchased the telephone line extending from Batesville to Delmar and material has been purchased for building an extension to it.

BRADLEY, S. D.—The Bradley-Crocker Telephone Company, which was recently incorporated, will begin the construction of its line within a short time.

GROTON, S. D.—The Groton-Ferney Mutual Telephone Company is making preparations for extending its line from Andover.

NORMA, S. D.—The Lewis Mutual Telephone Company is establishing an exchange at this place.

KNOXVILLE, TENN.—The People's Telephone Company is pushing work on its new line to Sevierville. It is completed as far as Beech Springs and service is being given that section.

BROOKLAND, TEX.—A telephone exchange will be installed here by the Sabine Valley Telephone Company within a short time.

EAGLE LAKE, TEX.—The farmers along the route between Eagle Lake and Chesterville are considering the construction of a private telephone line.

HASKELL, TEX.—The Haskell Telephone System has contracted for a 500-line switchboard, to meet the increased demands on the service.

PORT ARTHUR, TEXAS.—The South Texas Telephone Company will replace the present telephone system with a common battery system. Two 400 pair cables will be strung and a new building will be erected.

SULPHUR SPRINGS, TEX.—The Hopkins County Rural Telephone Association is extending its lines. A new switchboard with ten lines has been put in at Ridway; fifteen more lines have been added to the Yantis exchange and five to the Shook's Chapel exchange.

TAYLOR, TEX.—Citizens of the Wuthrich Hill district are building an independent telephone line into Taylor.

VERNON, TEXAS.—The Home Circle Telephone Company, formerly known as the Oklaunion Telephone Company, recently reorganized for the purpose of extending its lines.

FARMINGTON, UTAH.—The construction of the system of the recently organized Davis County Independent Telephone Company is progressing rapidly. The Utah Independent Telephone Company is building a line from Salt Lake City to connect with the Davis County company near the south end of the county.

CHRISTIANSBURG, VA.—The Virginia & Tennessee Telephone Company is rebuilding its system between this place and Cambria.

FREDERICKSBURG, VA.—The stockholders of the new telephone line known as the Rappahannock & Potomac Telephone Company recently instructed the directors to complete the line to Montross, the county seat of Westmoreland county, and to build a new through line from Colonial Beach to Fredericksburg.

GOLDENDALE, WASH.—The Goldendale Telephone Company has ordered a new switchboard with a capacity of 600 lines.

SHERMAN, WASH.—The lines of the Sherman Telephone Company will be rebuilt.

SPOKANE, WASH.—W. E. Herring, district engineer of the Federal Forestry Bureau, having 22 national forest reserves in Washington, Oregon and Alaska under his supervision, announces that it is expected that $200,000 will be spent in the improvement of trails, bridges and telephone lines in this district.

SPOKANE, WASH.—The Interstate Telephone Company has closed a fifty-year traffic agreement with the Montana Independent Telephone Company. The Montana Independent Telephone Company has exchanges at Butte, Anaconda, Billings, Great Falls, Lewiston, Bridges, and covers practically every town in western Montana. The Interstate covers various towns in Washington and northern Idaho, and jointly they will have one through copper circuit to Butte, with another circuit to take care of the local business. To complete this through circuit will necessitate the building of a line from Mullan, Idaho, to Missoula, Mont.

WENATCHEE, WASH.—The Farmers' Telephone & Telegraph Company will spend $15,000 in improvements this season, beginning work at once. The open wires will be replaced by cable and a number of new poles used.

WESTON, W. VA.—The People's Telephone Company is building several new circuits in and around Weston, to accommodate the new business.

ADA, WIS.—The Ada Telephone Company will extend its lines so as to reach a greater number of the farmers in this vicinity.

ALLENTON, WIS.—The Allenton-Kohlsville Telephone Company will build about twenty miles of new line this Spring, and will also rebuild some of its old lines.

AMHERST, WIS.—The Amherst Telephone Company has decided to extend its lines to Stevens point.

APPLETON, WIS.—Construction has been commenced on the plant of the South Greenville Farmers' Telephone Company, which will connect with the local exchange.

CLAM FALLS, WIS.—The McKinley Telephone Company has extended a line to this place.

GLEN FLORA, WIS.—The Hawkins Telephone Company will construct a local line to this place.

BIG PINEY, WYO.—The Kemmerer-Big Piney Telephone Company is erecting an exchange here, the materials for the building having arrived.

ROCK SPRINGS, WYO.—The Kemmerer-Big Piney Telephone Company is going to connect with Rock Springs. The line is to be strung about 40 miles to connect with the Independent line between Lanfer and Pinedale near the Big Sandy. Heretofore the Bell company has had no competition in this vicinity.

LETHBRIDGE, ALTA., CAN.—The Provincial Government has purchased a site in this place for the erection of a telephone exchange building which will be used as the long distance headquarters for Southern Alberta.

OXBOW, SASK., CAN.—The Oxbow Telephone & Lighting Company has decided to build long distance telephone lines between Boscurvis, Arthur, Ashburton and Glen Ewen. T. H. Gregson and J. P. Tripp are interested in the matter.

SOMBRA, ONT., CAN.—The South Lambton Telephone Company is preparing to extend its lines to Thornyhurst and Bickford.

THEODORE, SASK., CAN.—The Springside Telephone Company will commence at once the work of building 80 miles of line. Switchboards will be installed at Theodore, Springside and Beaverdale.

WINNIPEG, MAN., CAN.—F. C. Patterson, chairman of the Manitoba Telephone Commission, states that a new exchange will be erected to take care of the increasing business in the western part of the city.

TORREON, MEX.—The Central Telephone Company has established a line between Torreon and Tiahualilo, the largest and most important ranch in this district, and communication may now be had with these two points and with the intervening ranches.